

FIG. 1

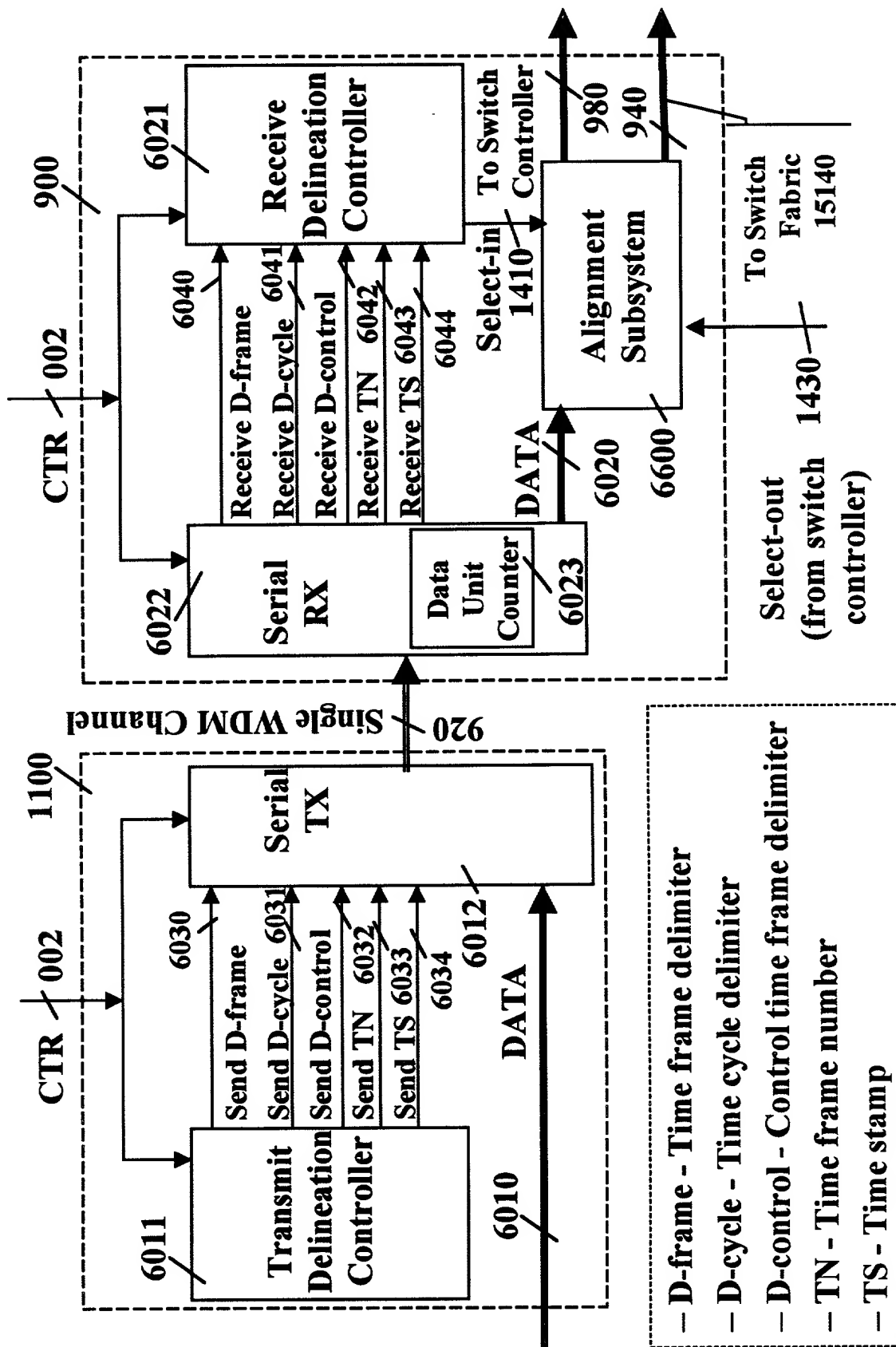


FIG. 2

Example:

TF1=15.325 microsec - High_capacity = OC-192

TF2 = 125 microsec - Low_capacity = OC-3

$\Rightarrow c = 64 = (OC-192/OC-3)$

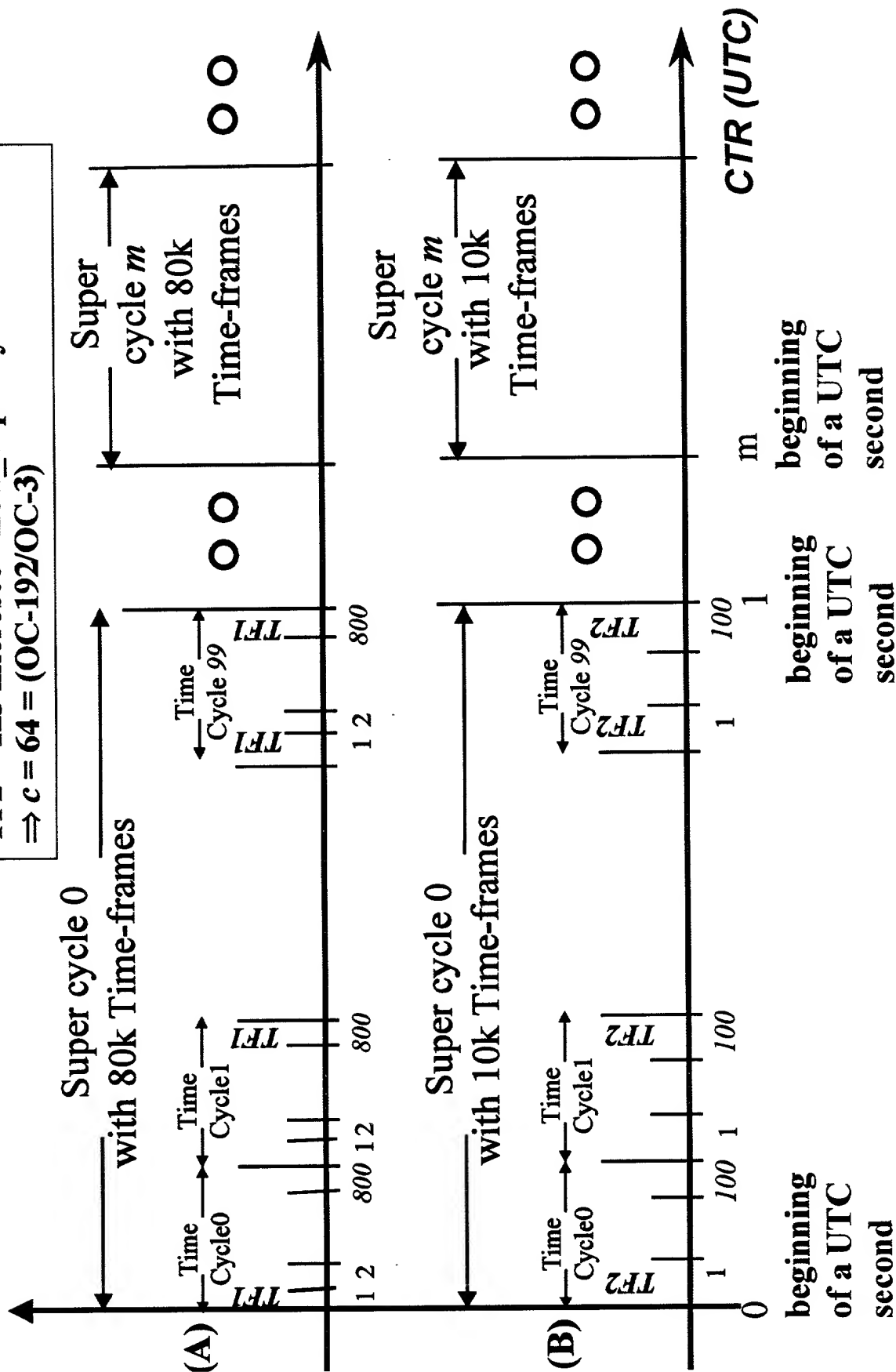


FIG. 3

UTC/CTR™ is used to forward time frames in a synchronized/pipelined manner

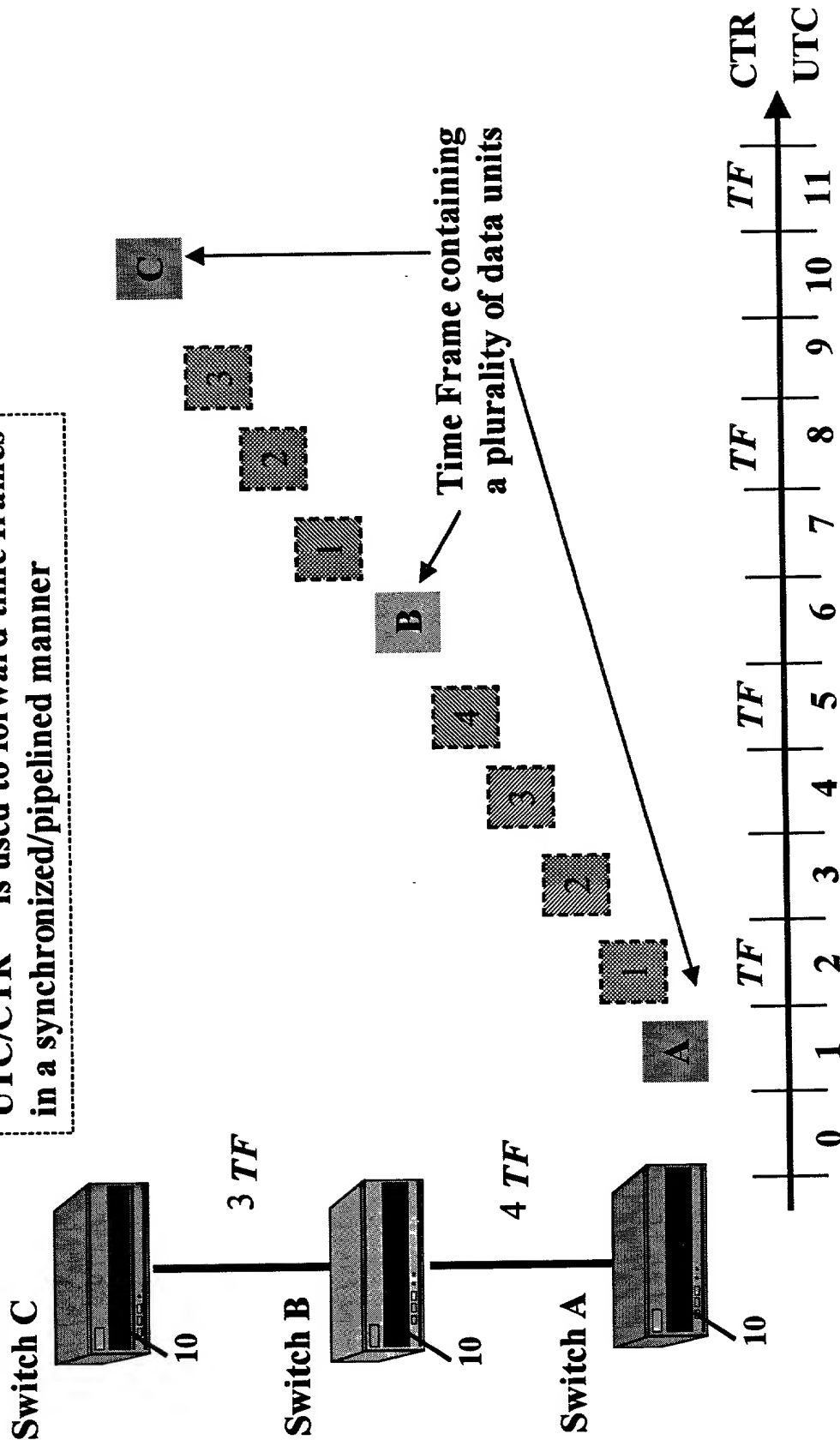


FIG. 4

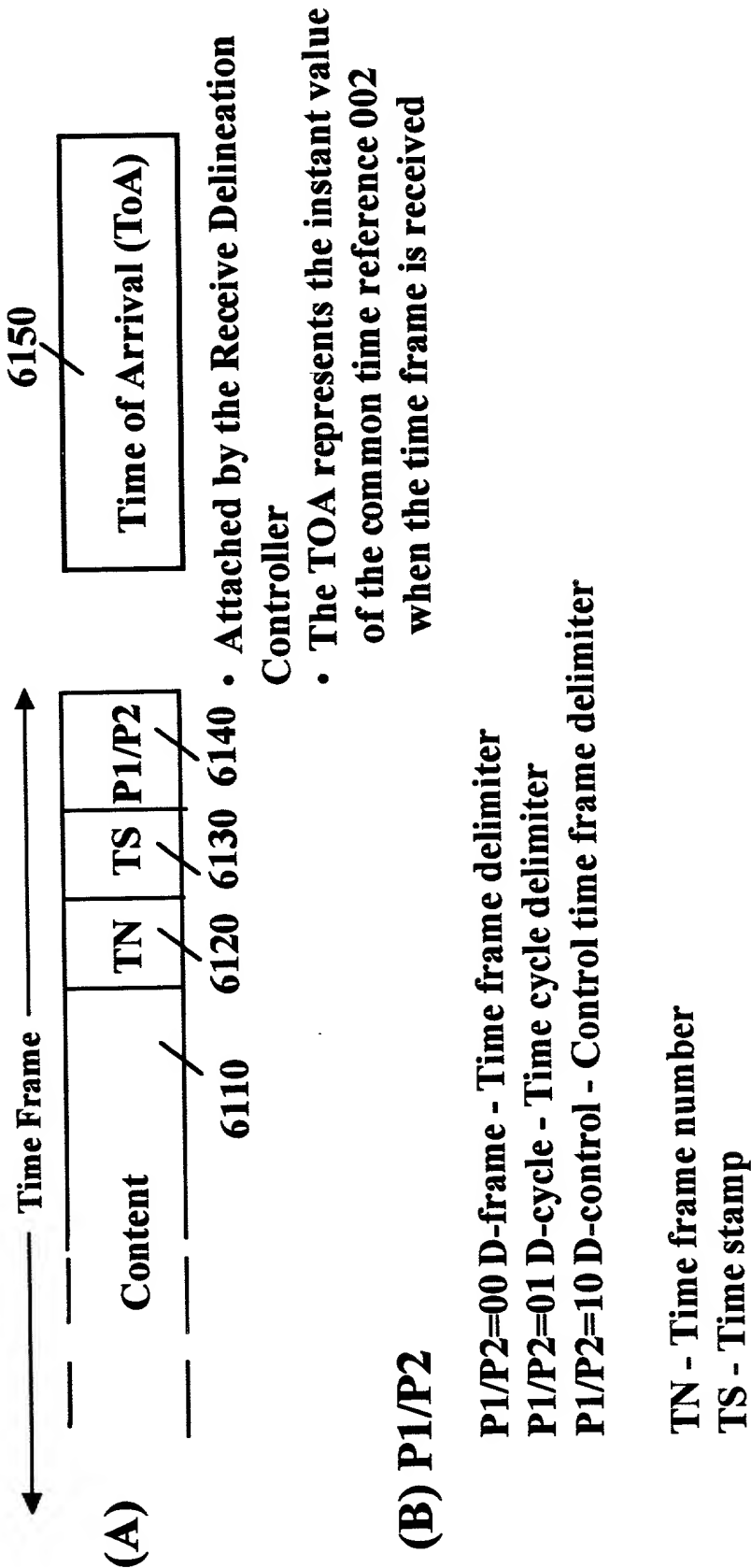


FIG. 5

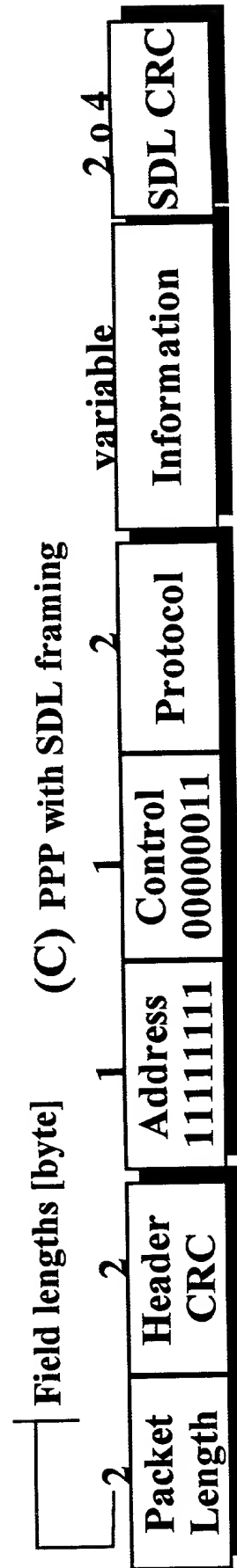
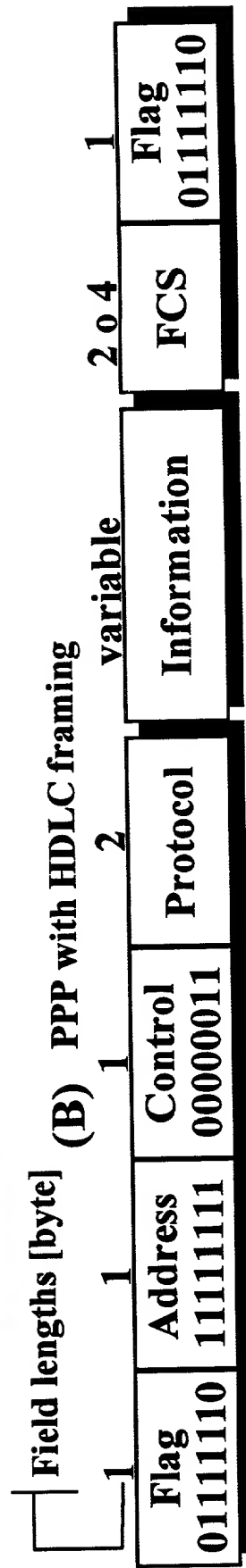
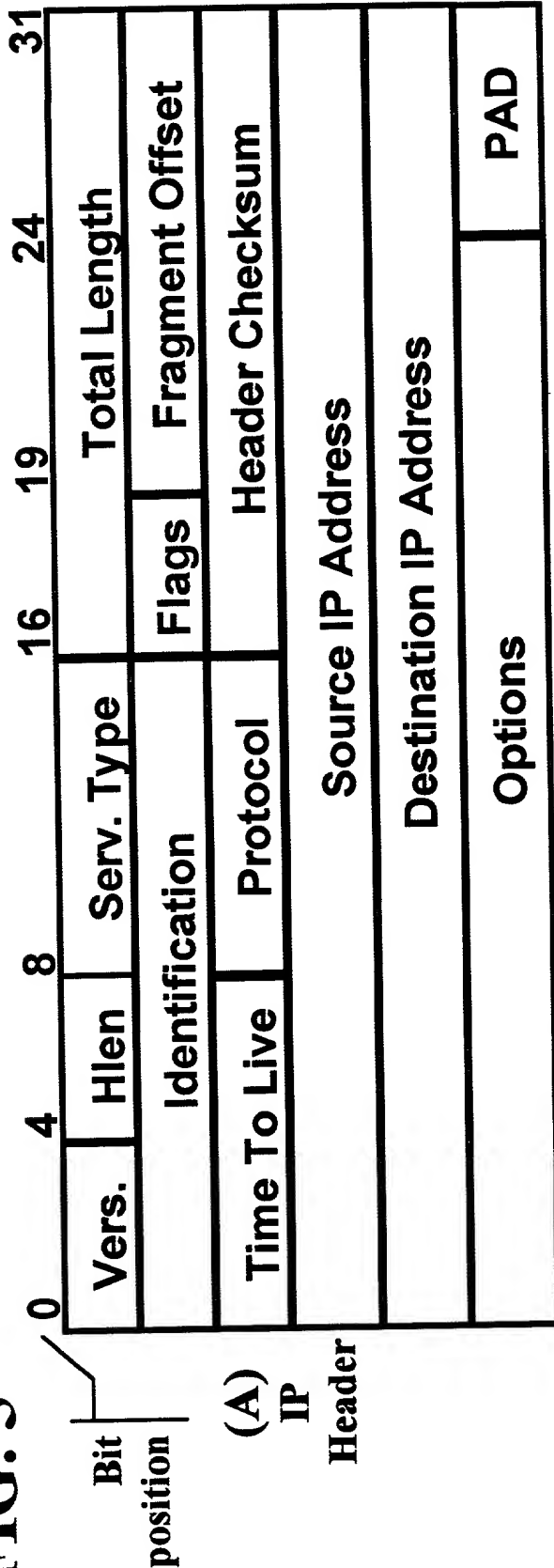
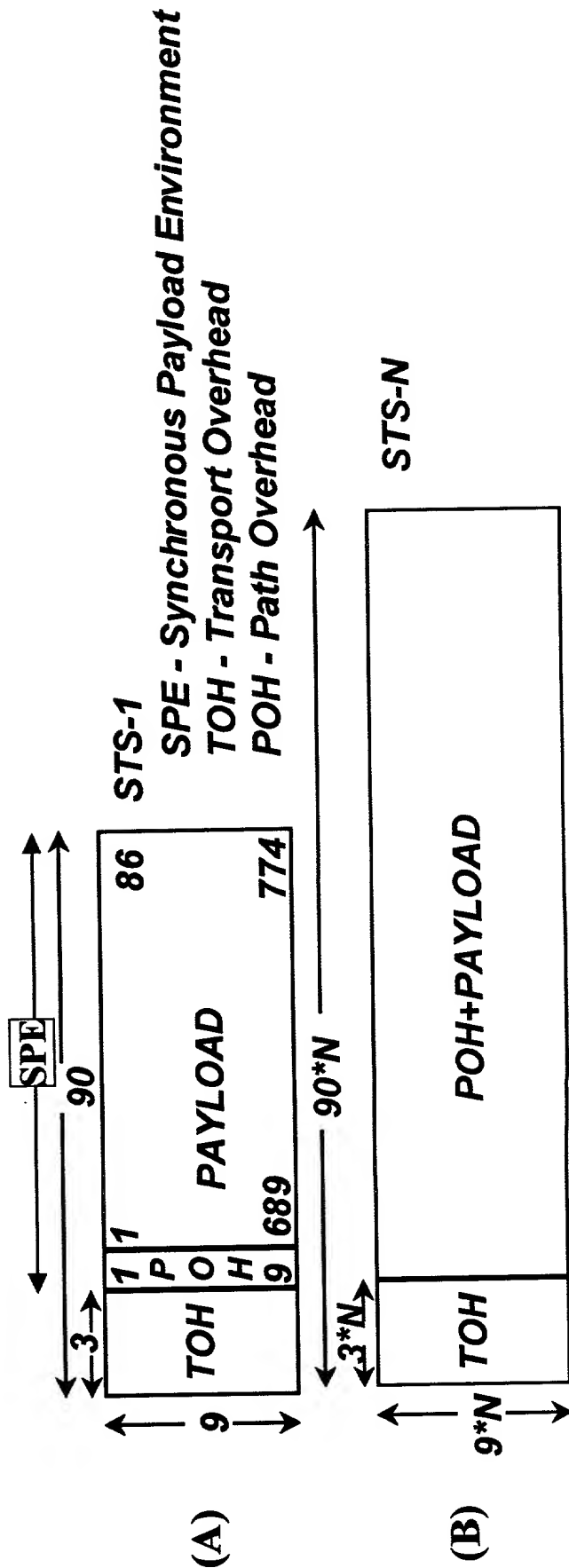


FIG. 6

- SONET - synchronous optical network
- Multiplexing method: byte interleaving
- Signal hierarchy: OC-N (STS-N)
 - STS-N rate: $N \times 51.84$ Mb/s
 - Frame format: 9 rows by $90 \times N$ columns
 - capacity: $N \times 810$ bytes in 125 microsecond.
 - overhead: $N \times 27$ bytes
 - payload: $N \times 783$ bytes



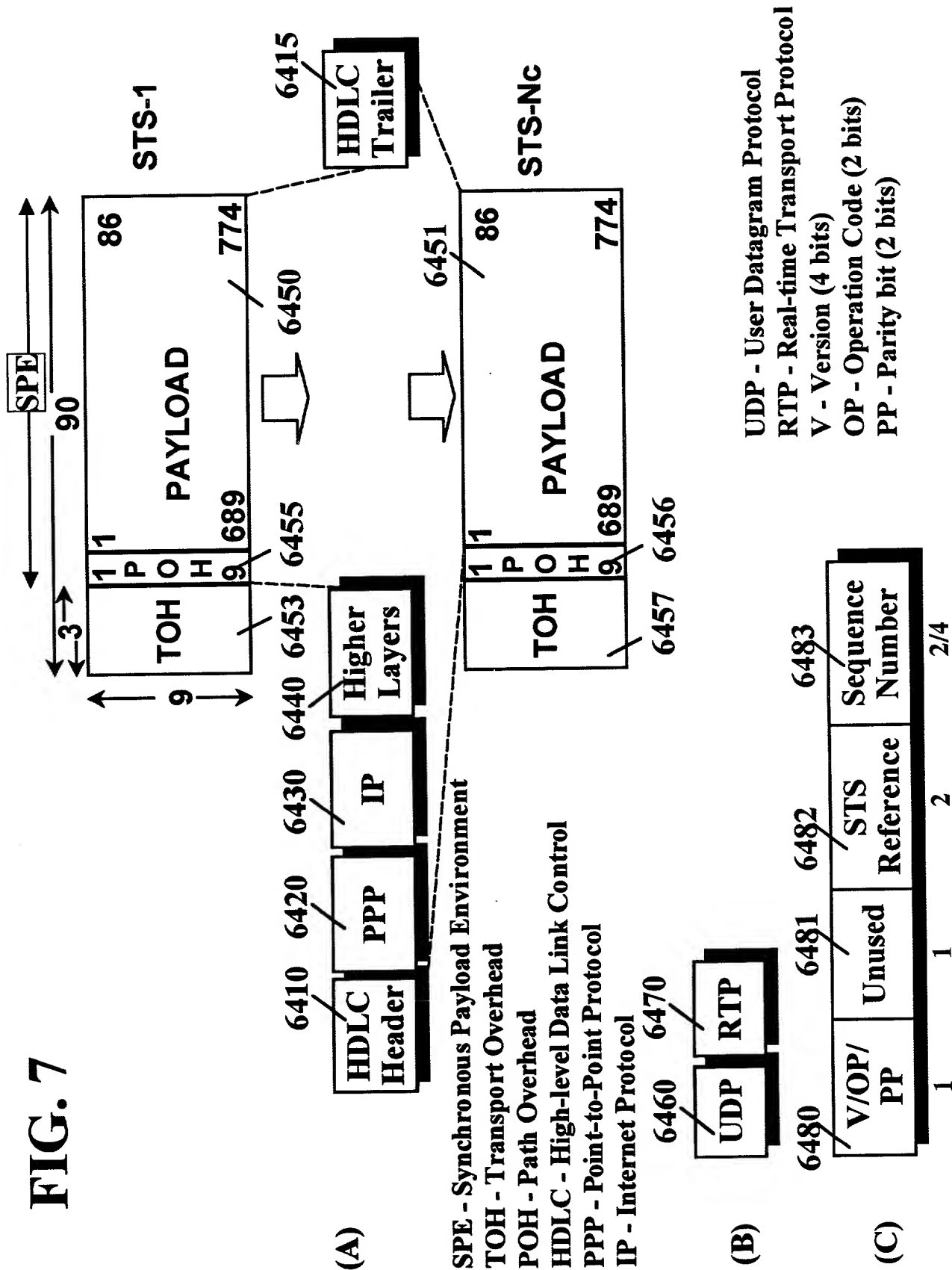
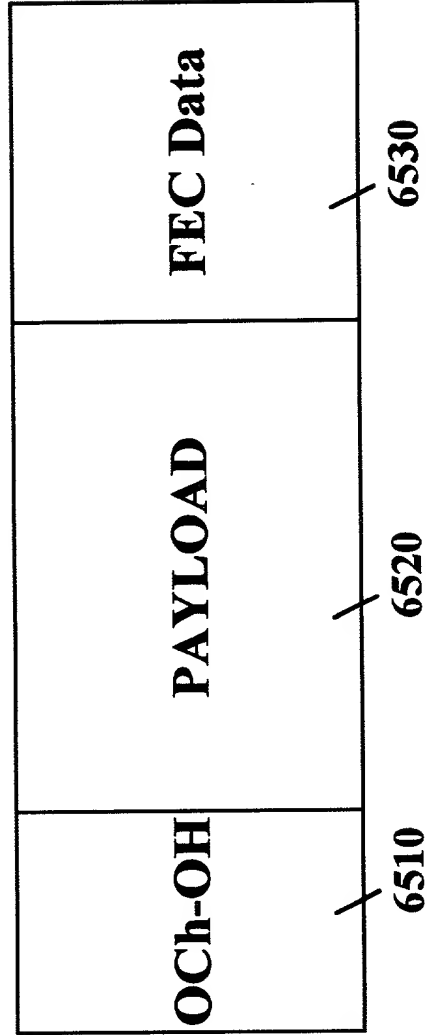


FIG. 7

FIG. 8



OCh - Optical Channel
OH - Overhead
FEC - Forward Error Correction

FIG. 9

TF Alignment of UTR(i) to UTC - with three input queues - principle of operation:

The same queue is not used simultaneously for:

1. Receiving data packets from the serial link, and
2. Forwarding data packets to the switch fabric

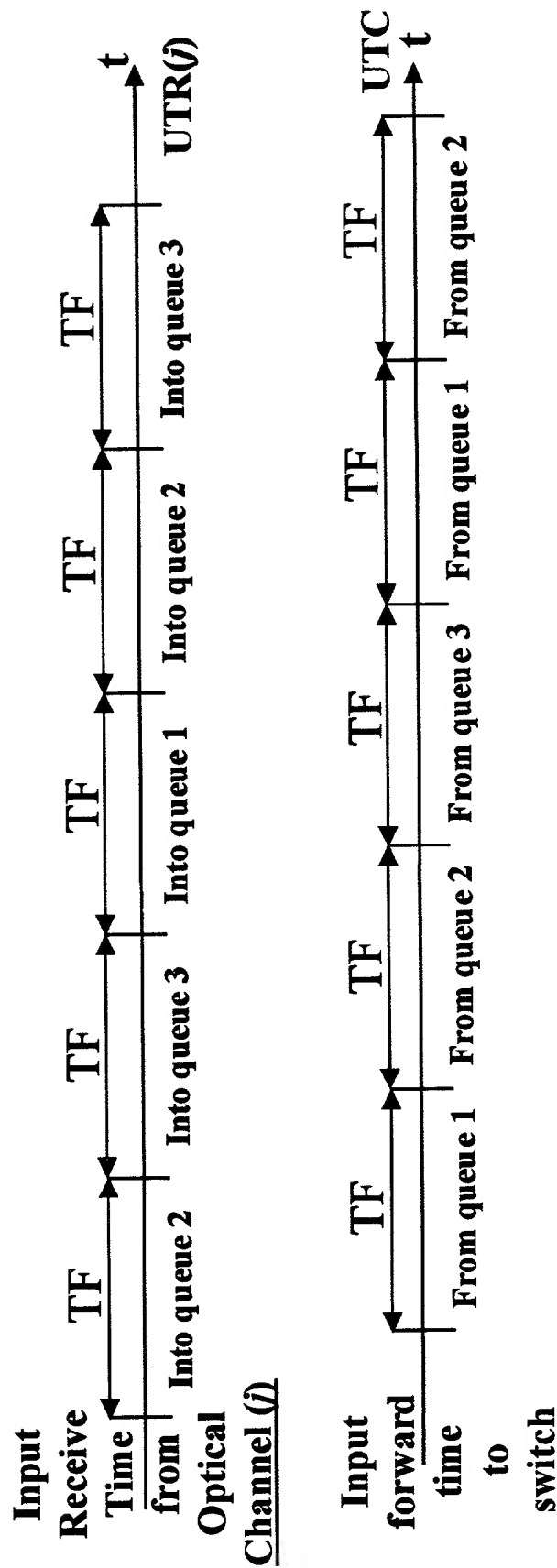
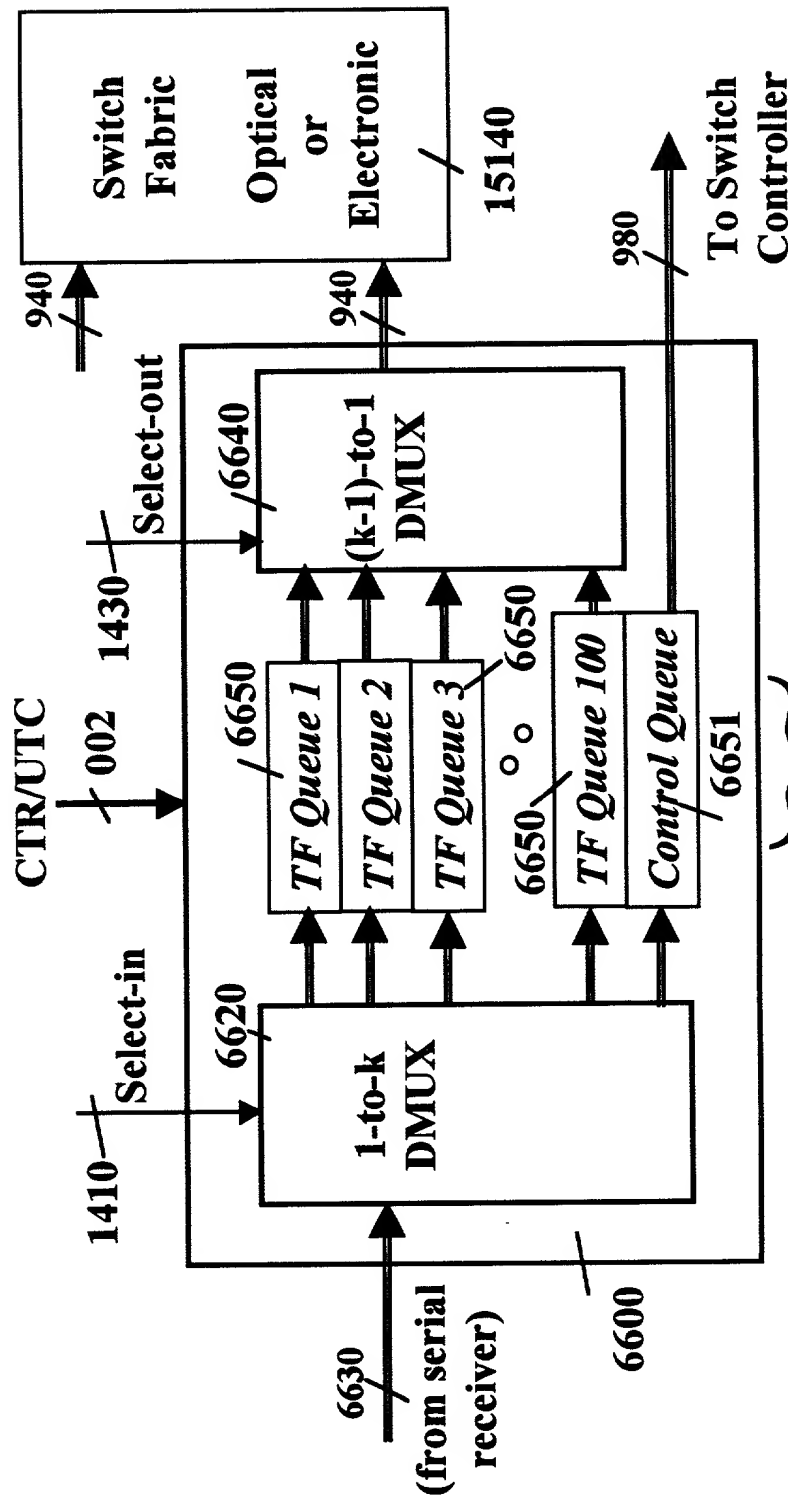


FIG. 10



Alignment Subsystem for Channel j at Input Port i
 with a Plurality of k Time Frame Queues, where k is
 the number of time frames in one time cycle

FIG. 11

Maximum alignment subsystem requirements for
local recovery from arbitrary timing failure:
- For immediate recovery a time measurement time stamp
should be sent every time frame and/or time cycle.

Time Cycle	OC-48 – 2.4 Gb/s	OC-192 – 9.6 Gb/s
1 ms	0.3 MByte	1.2 MByte
2 ms	0.6 MByte	2.4 MByte
4 ms	1.2 MByte	4.8 MByte
10 ms	3 MByte	12 MByte
20 ms	6MByte	24 MByte

FIG. 12

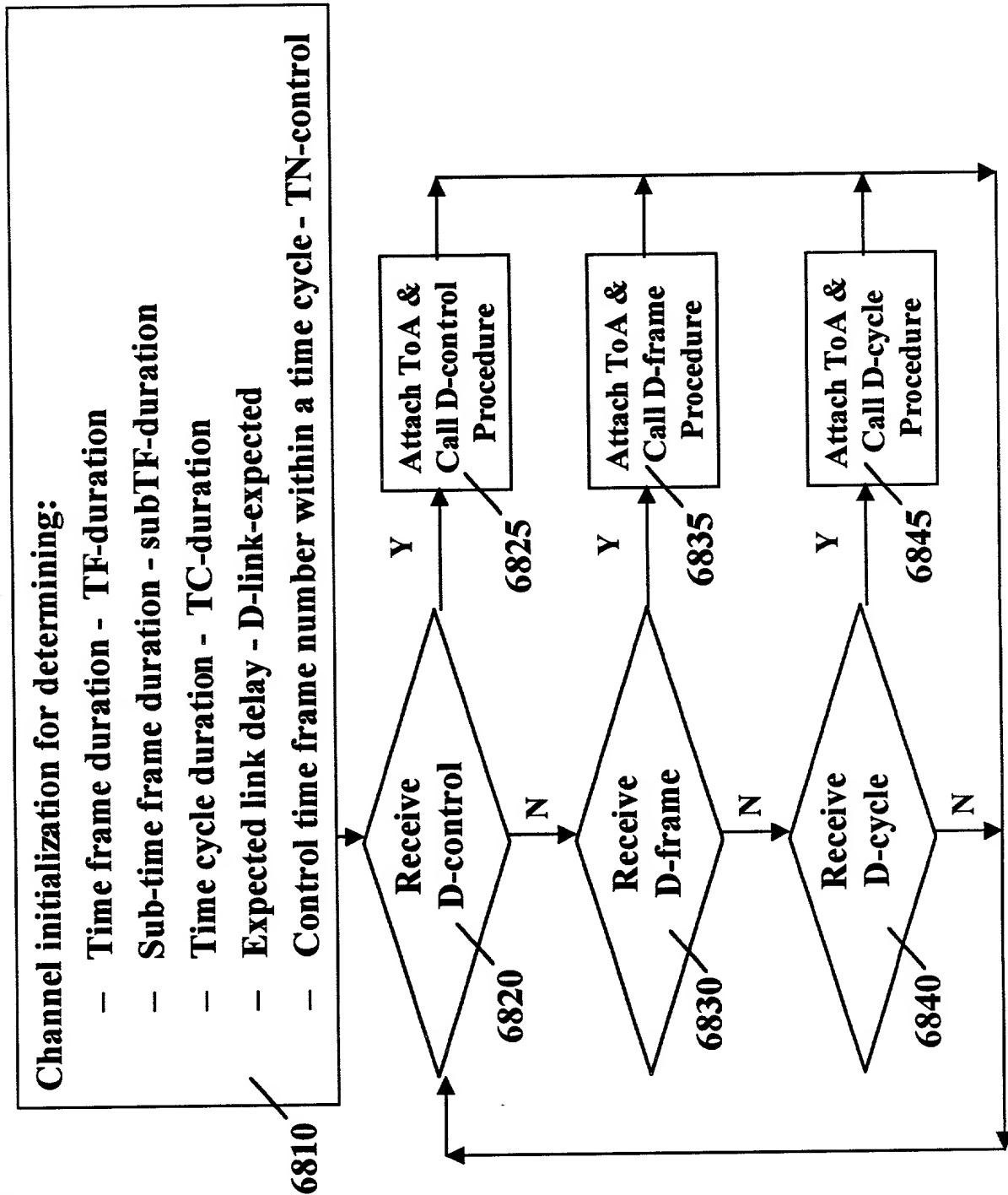


FIG. 13

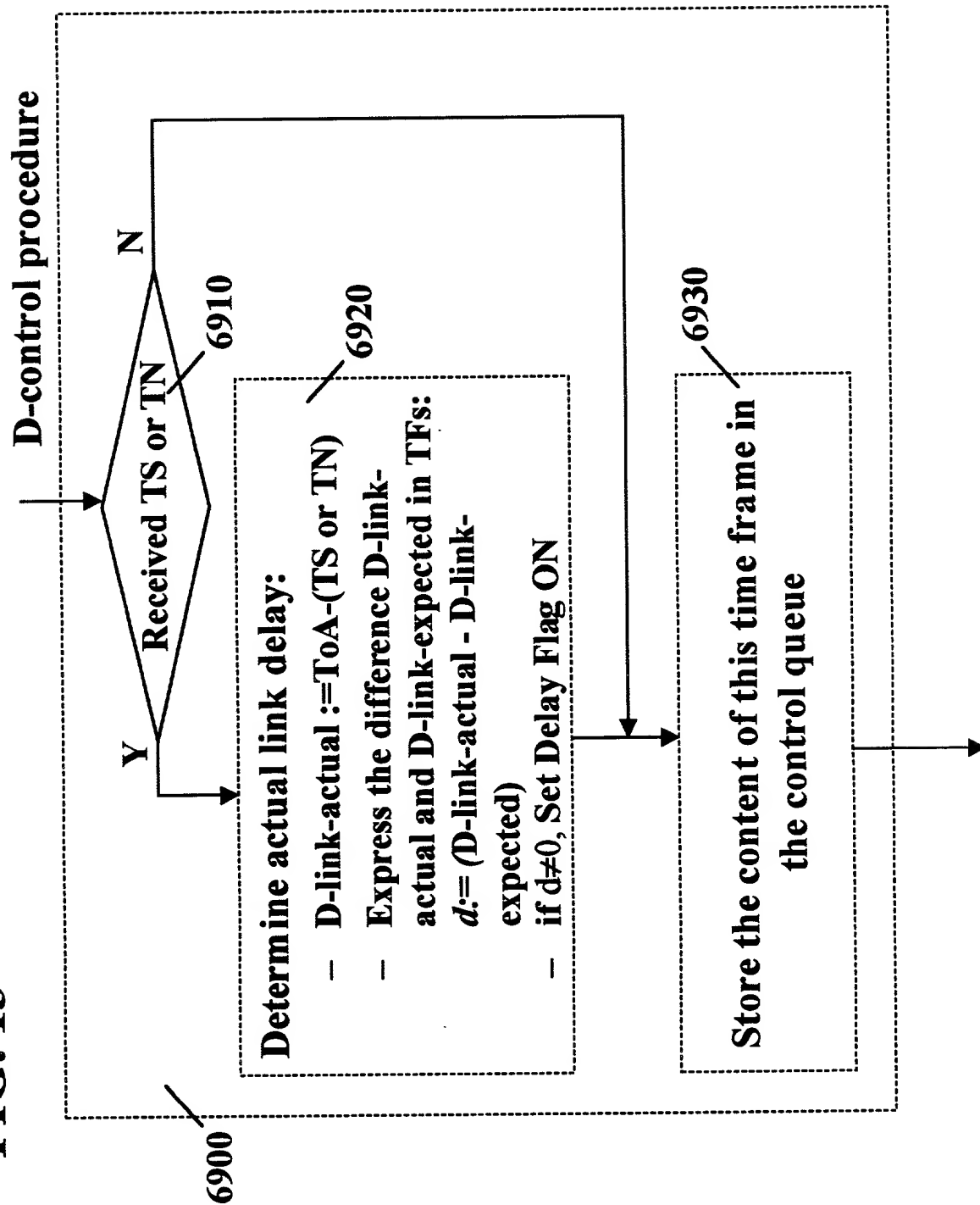


FIG. 14

D-frame procedure

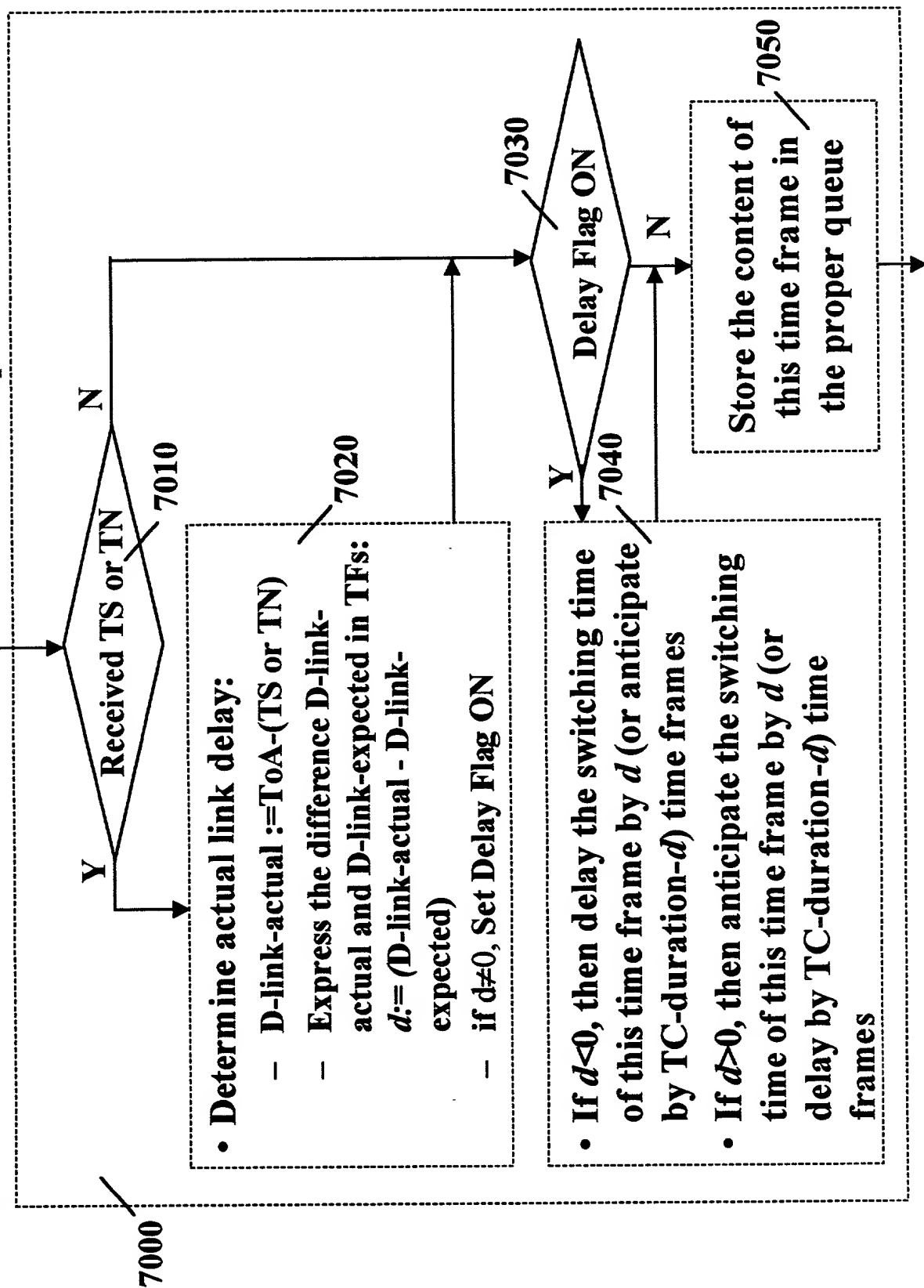
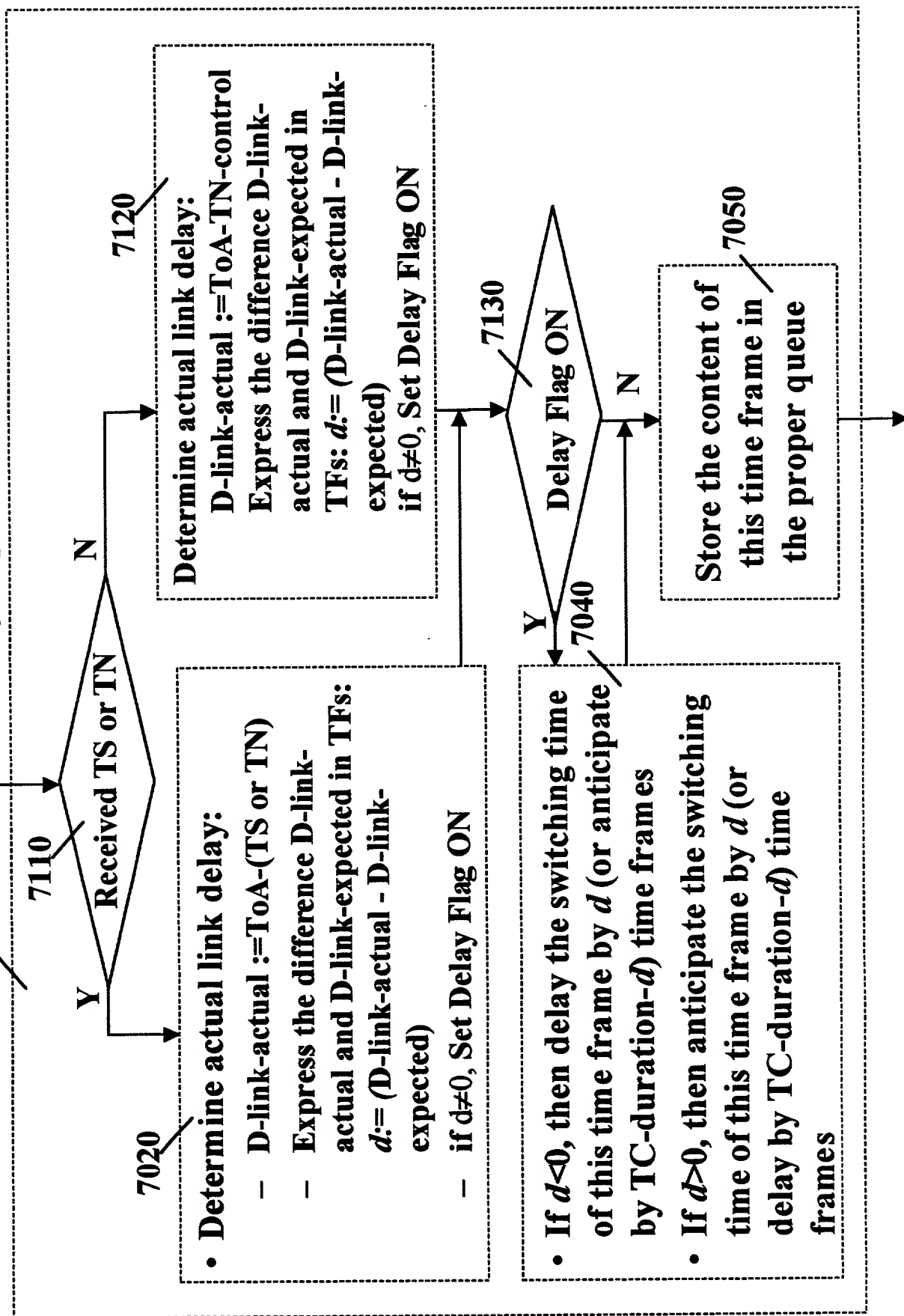


FIG. 15

D-cycle procedure



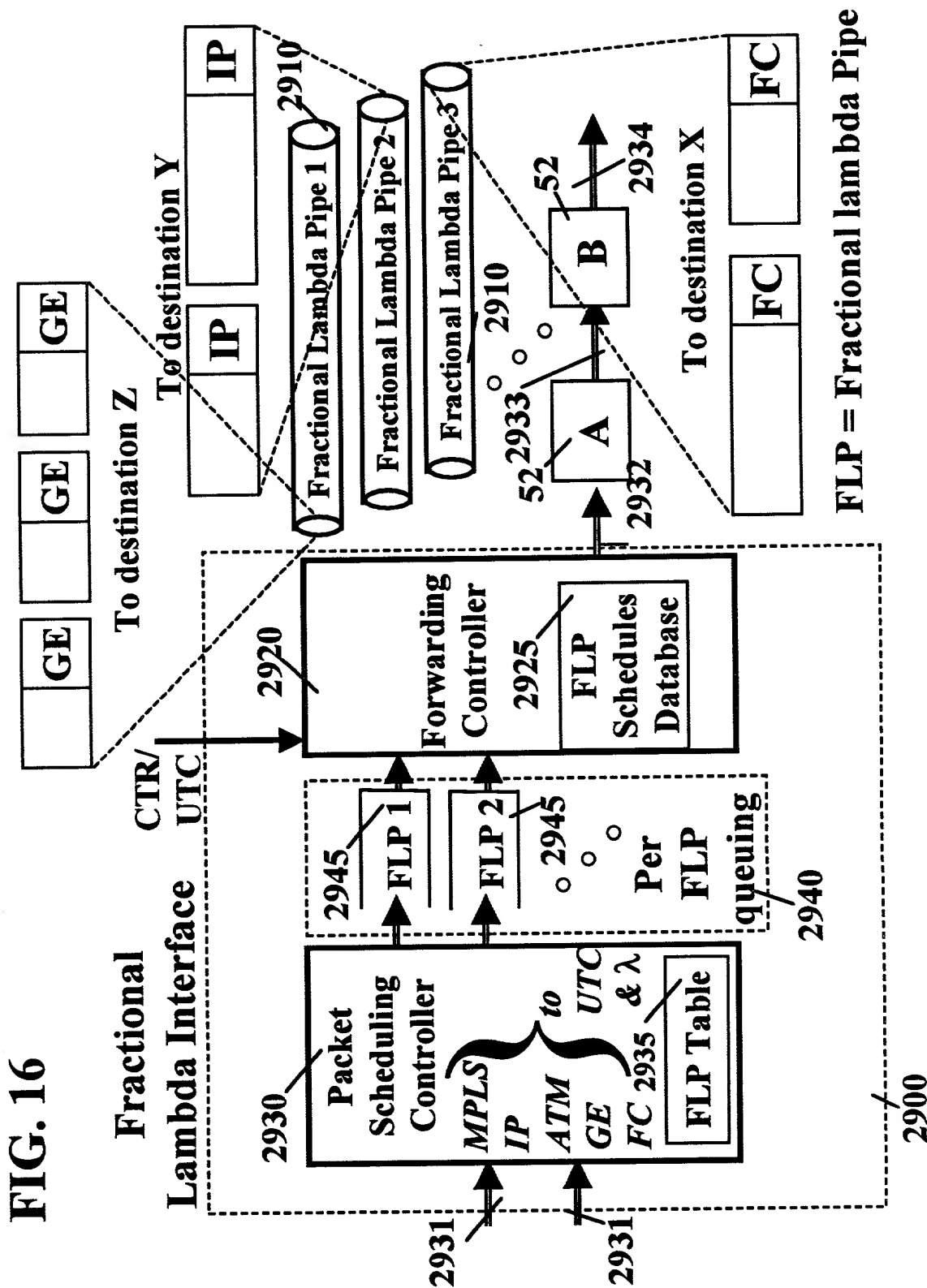


FIG. 17

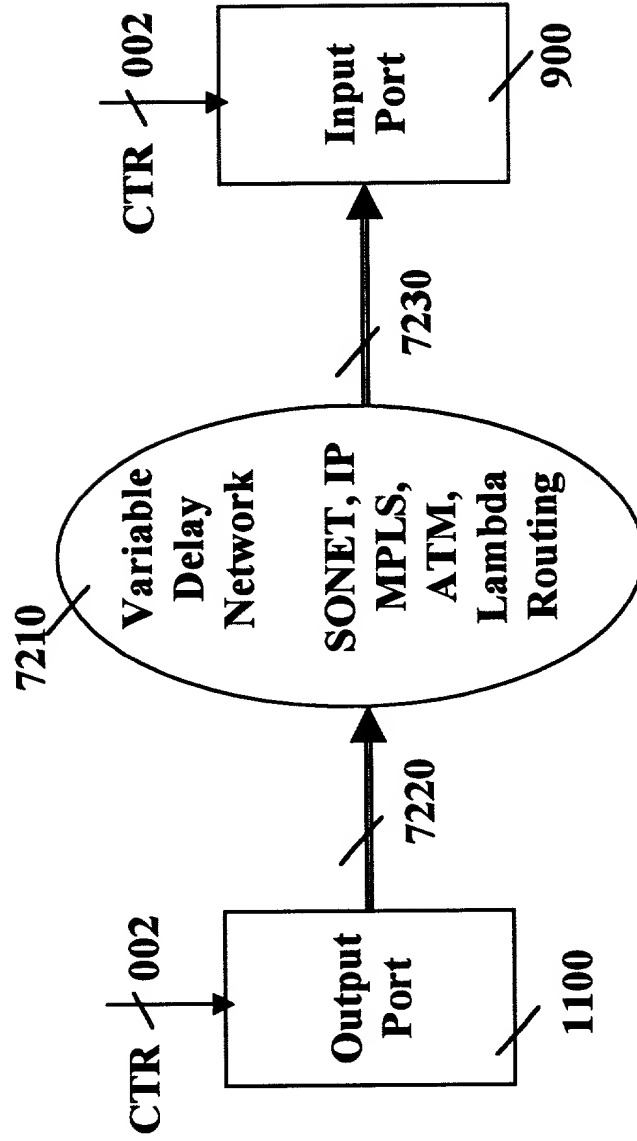


FIG. 18

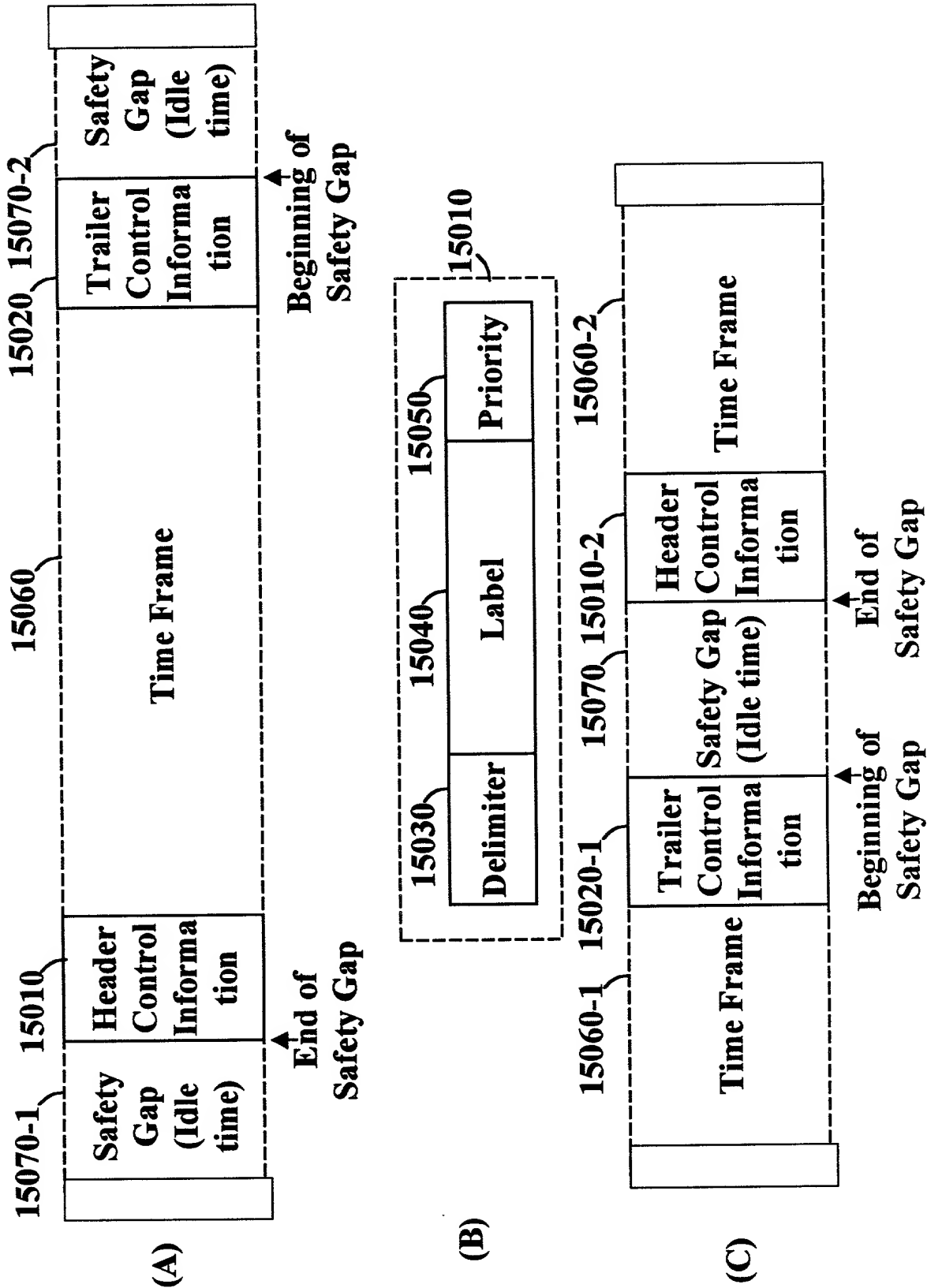


FIG. 19

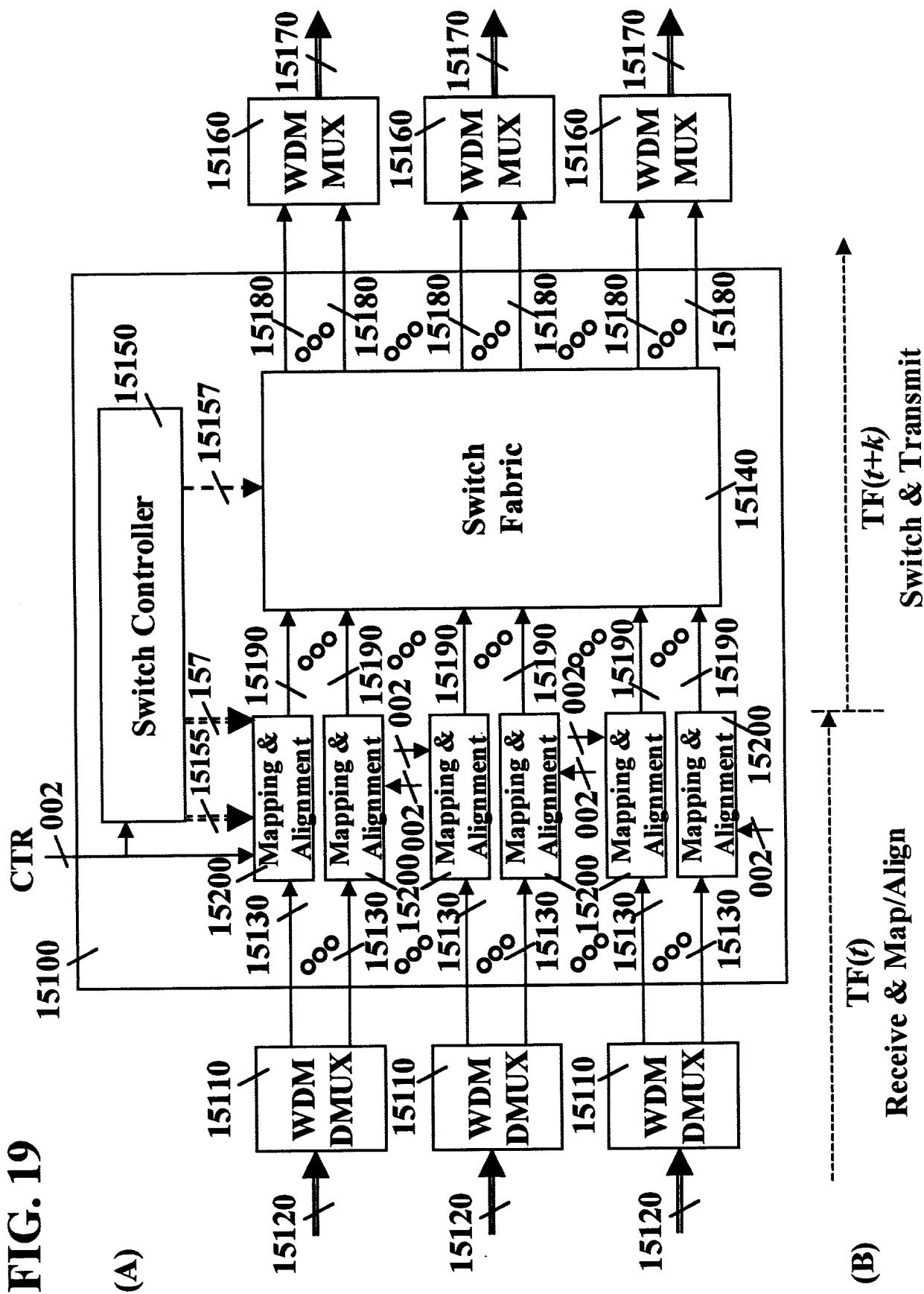


FIG. 20

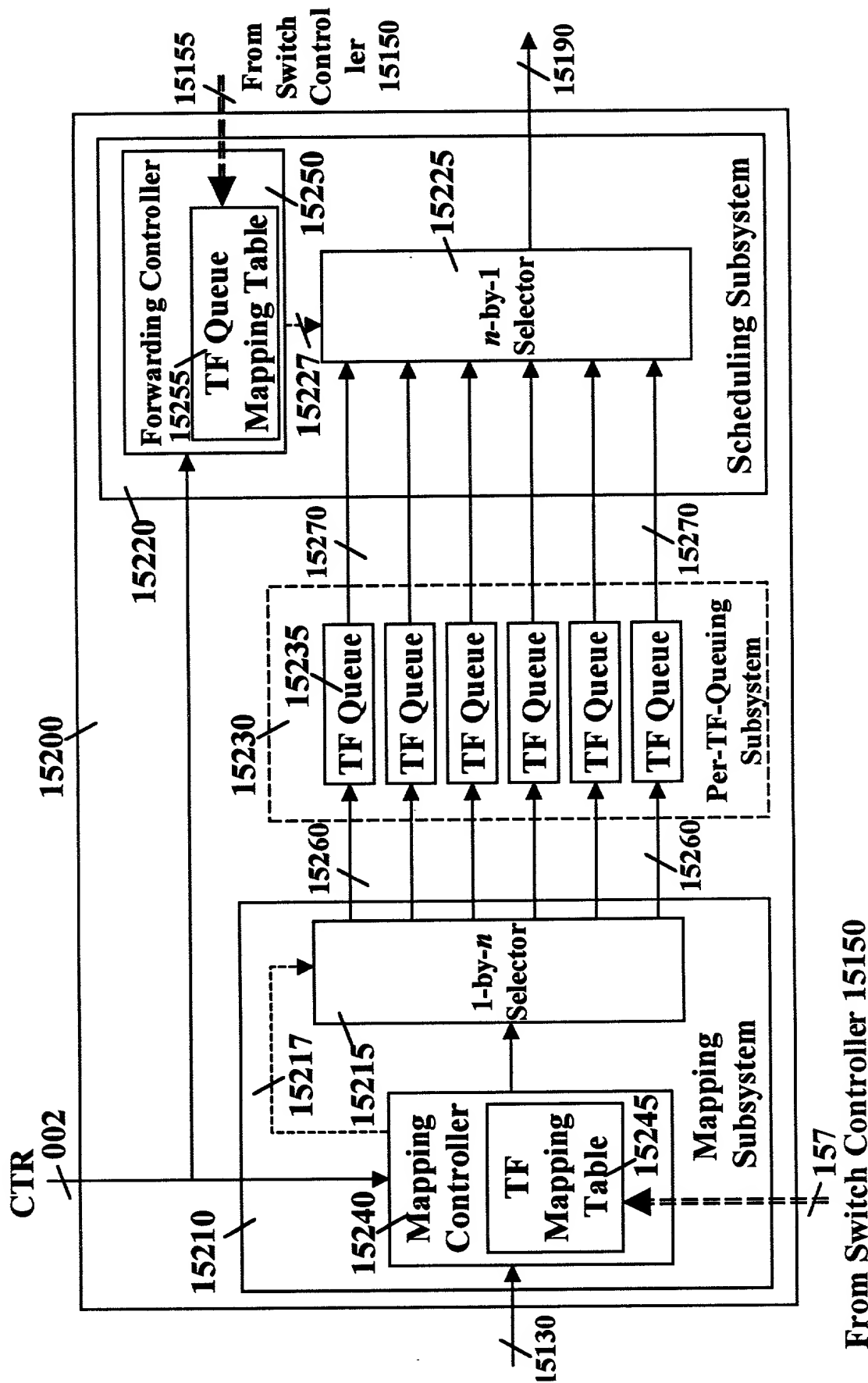


FIG. 21

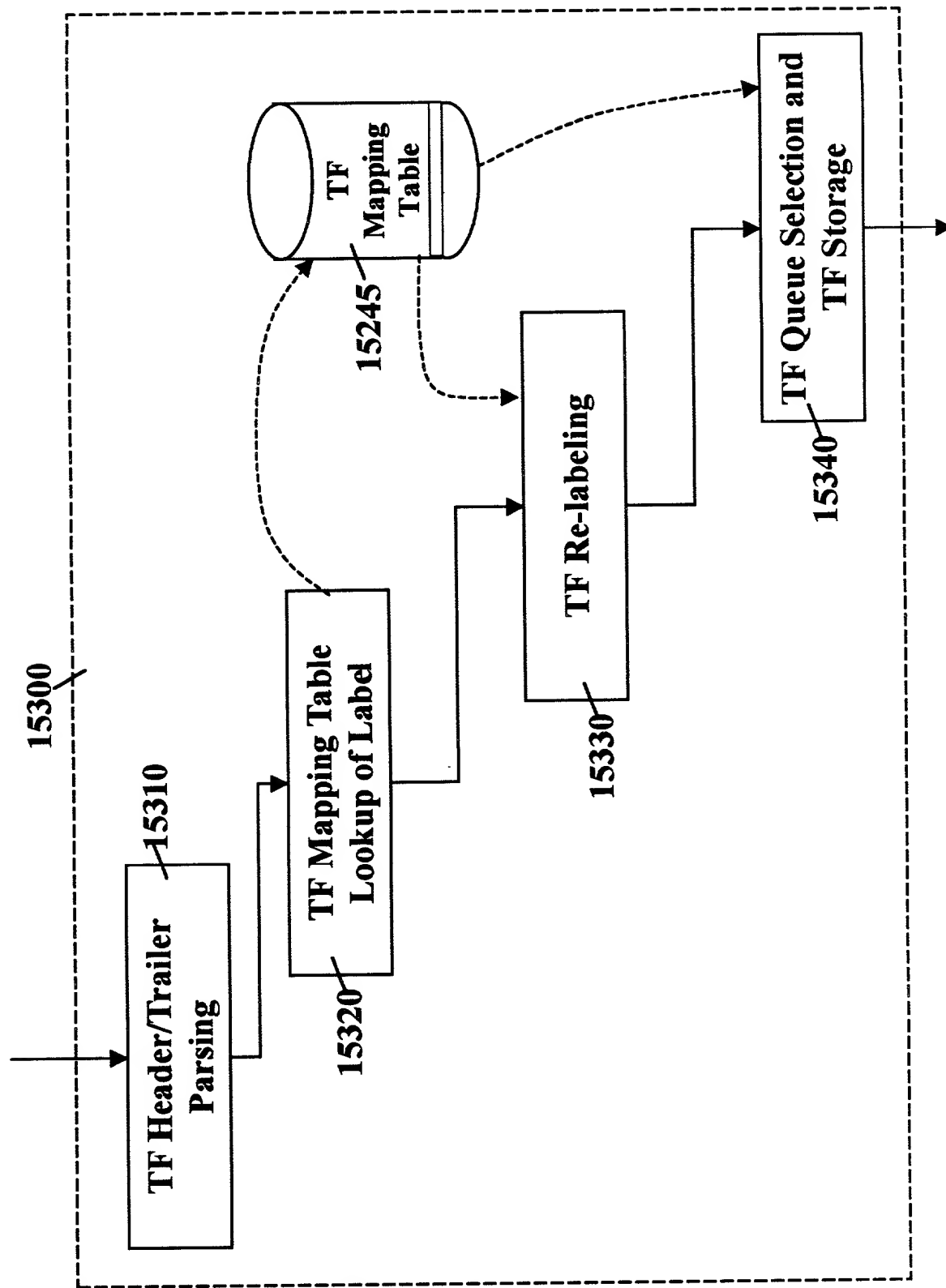


FIG. 23

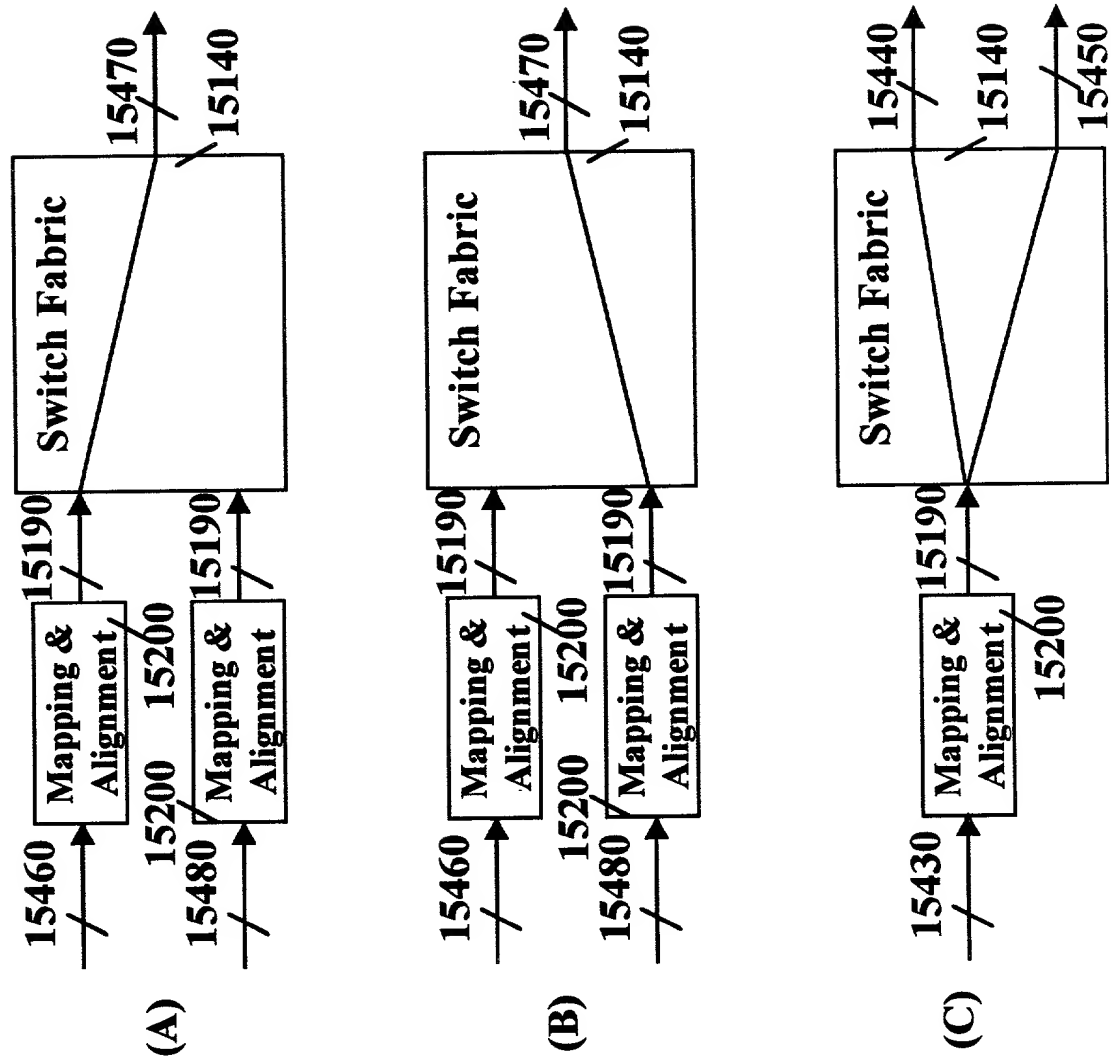


FIG. 24

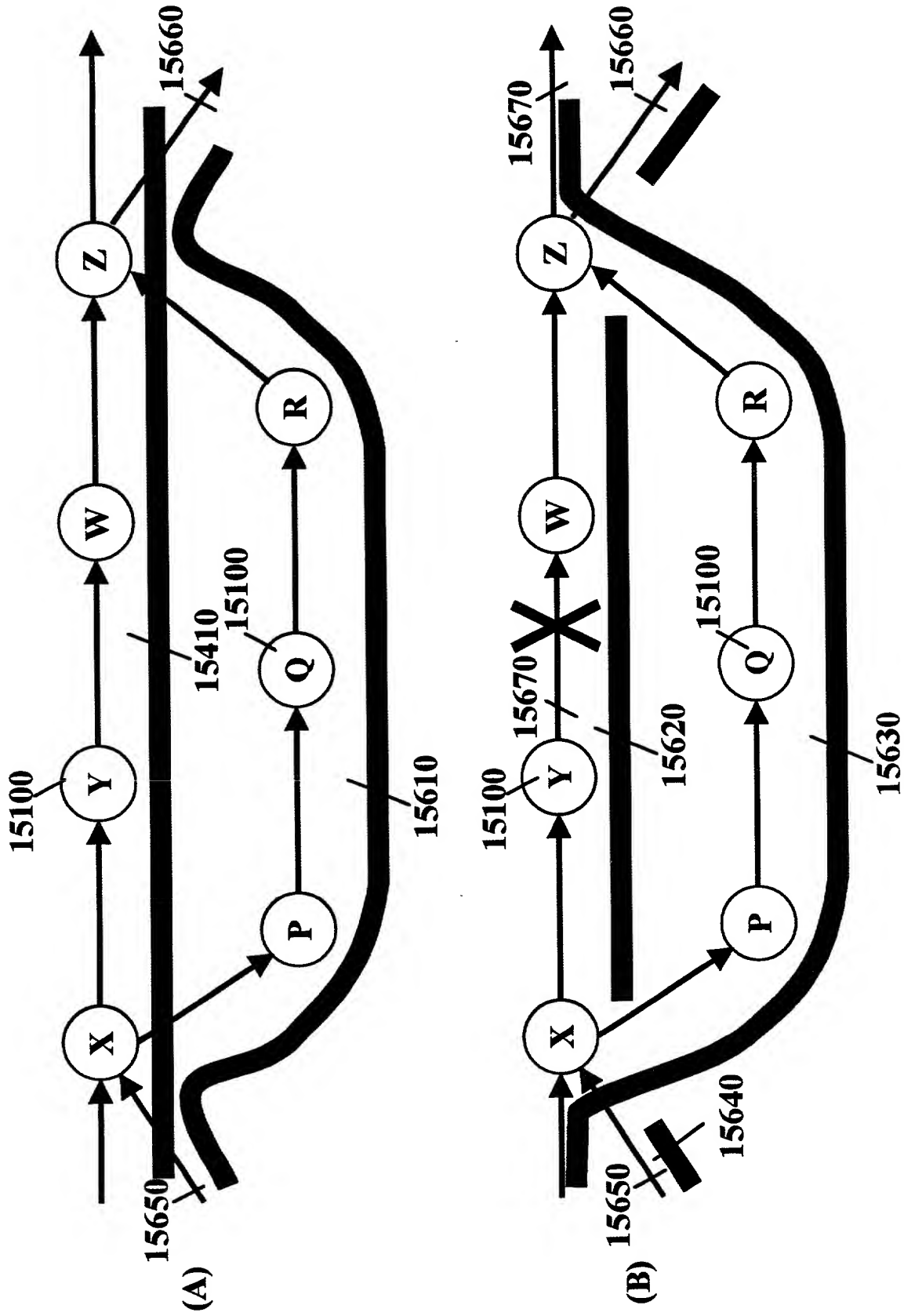
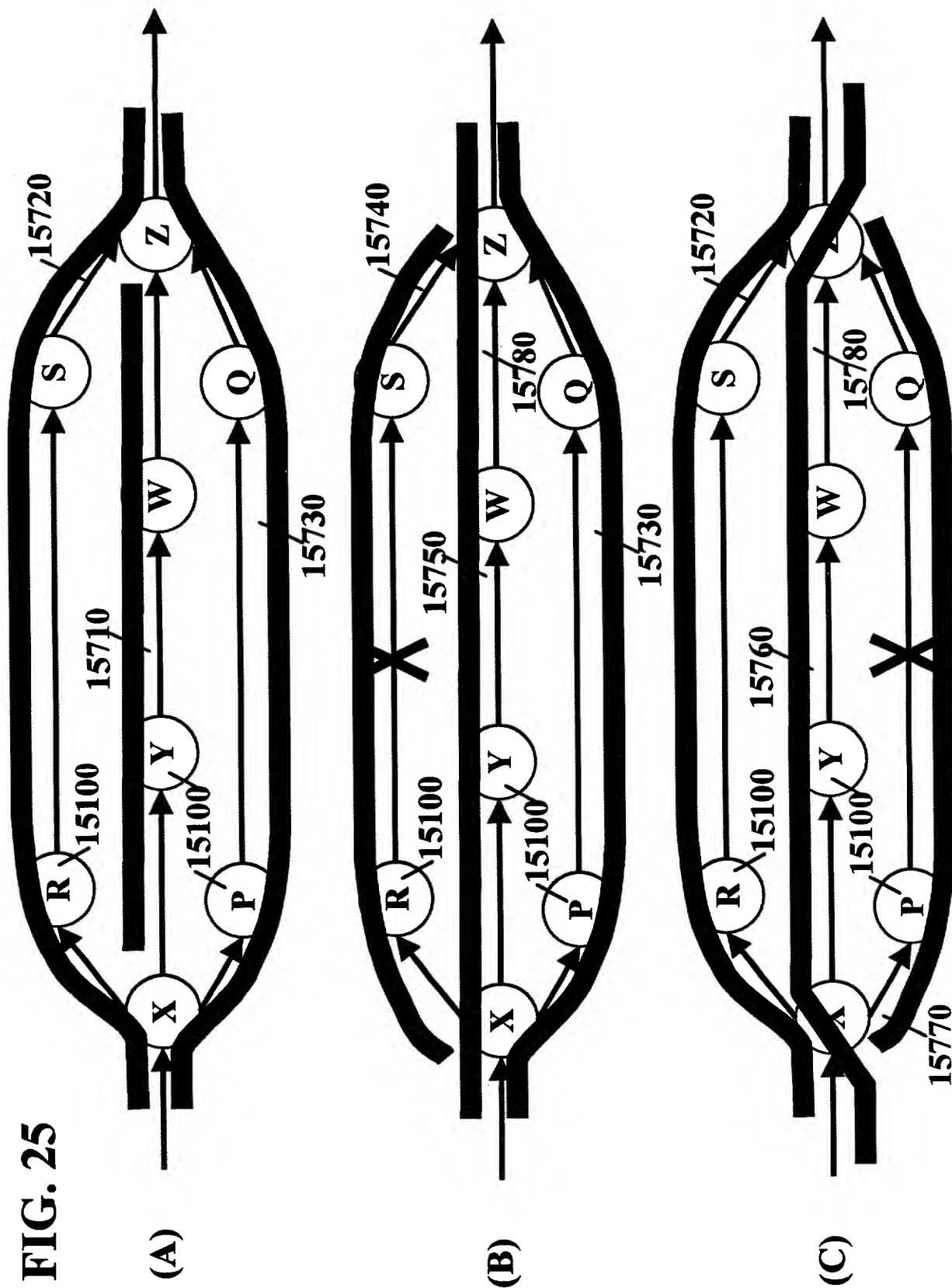
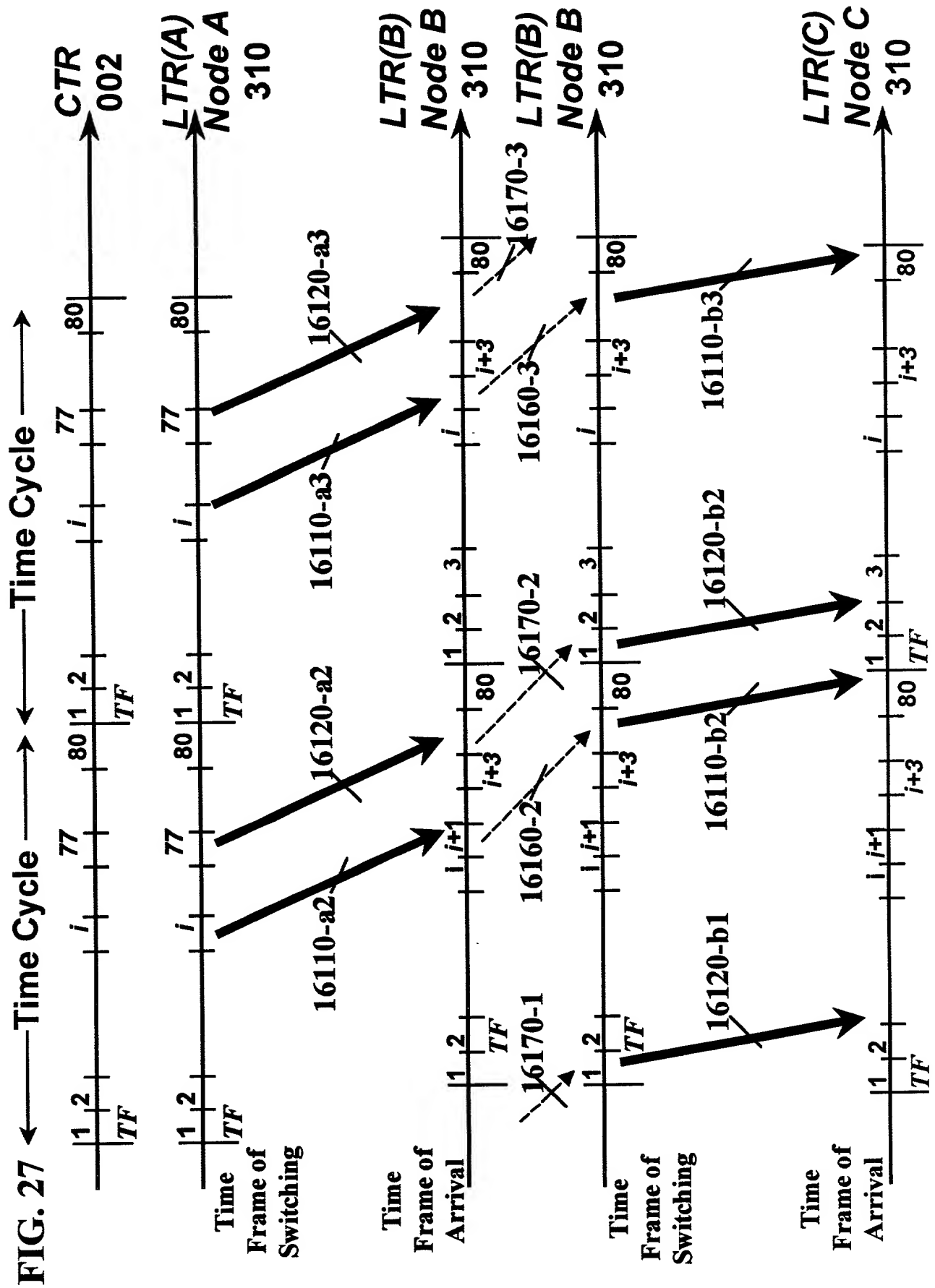


FIG. 25





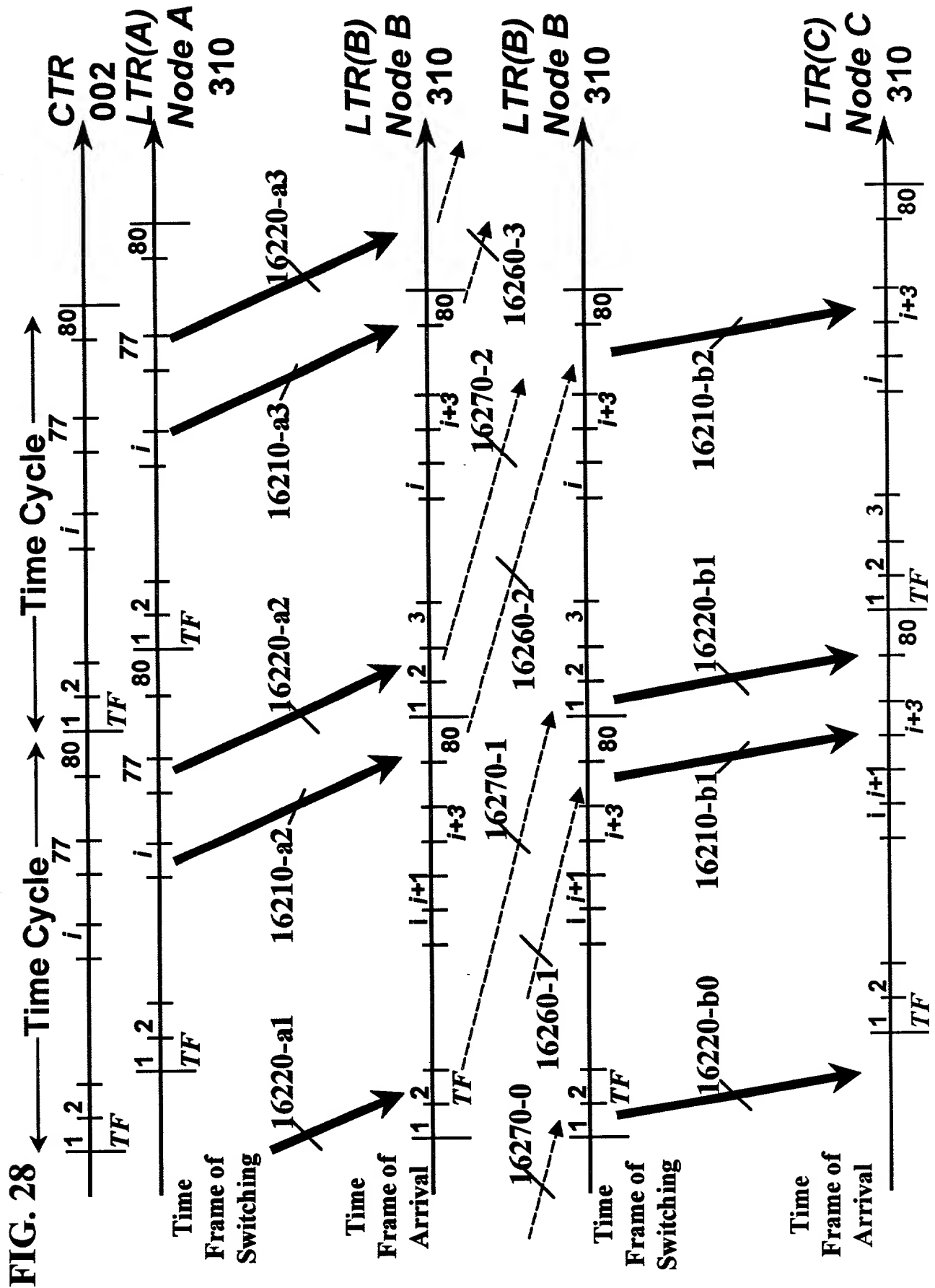


FIG. 29

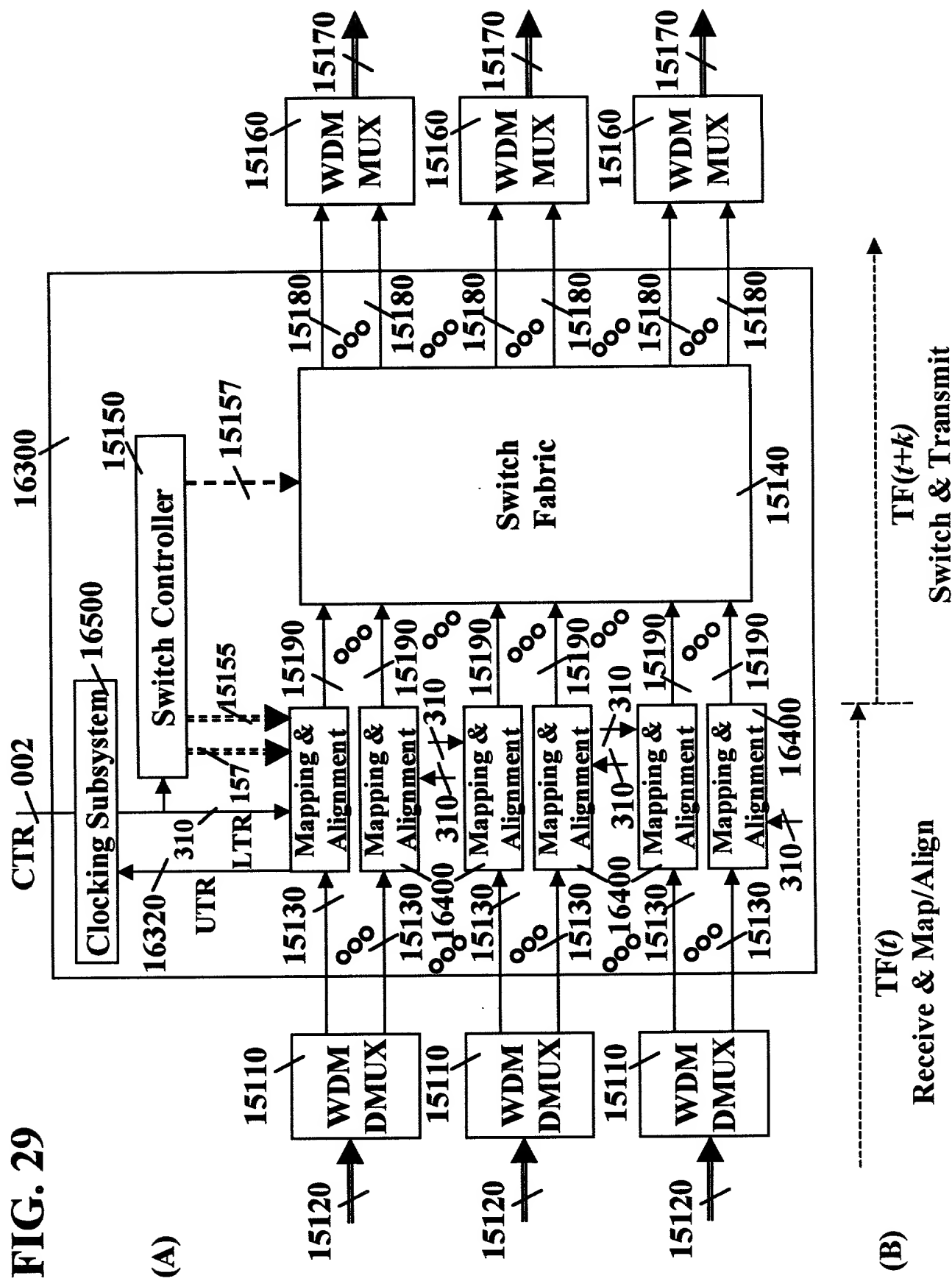


FIG. 30

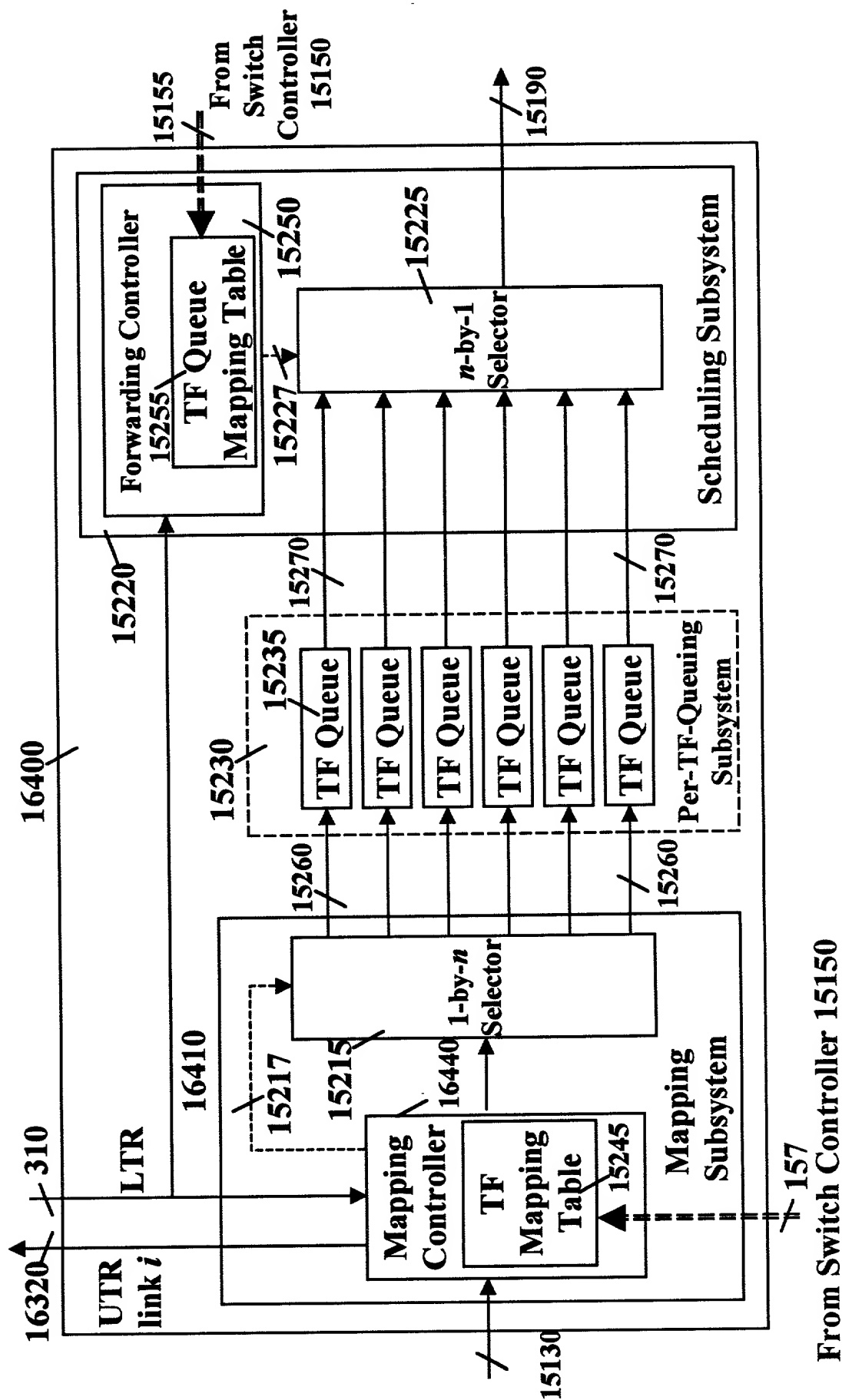


FIG. 31

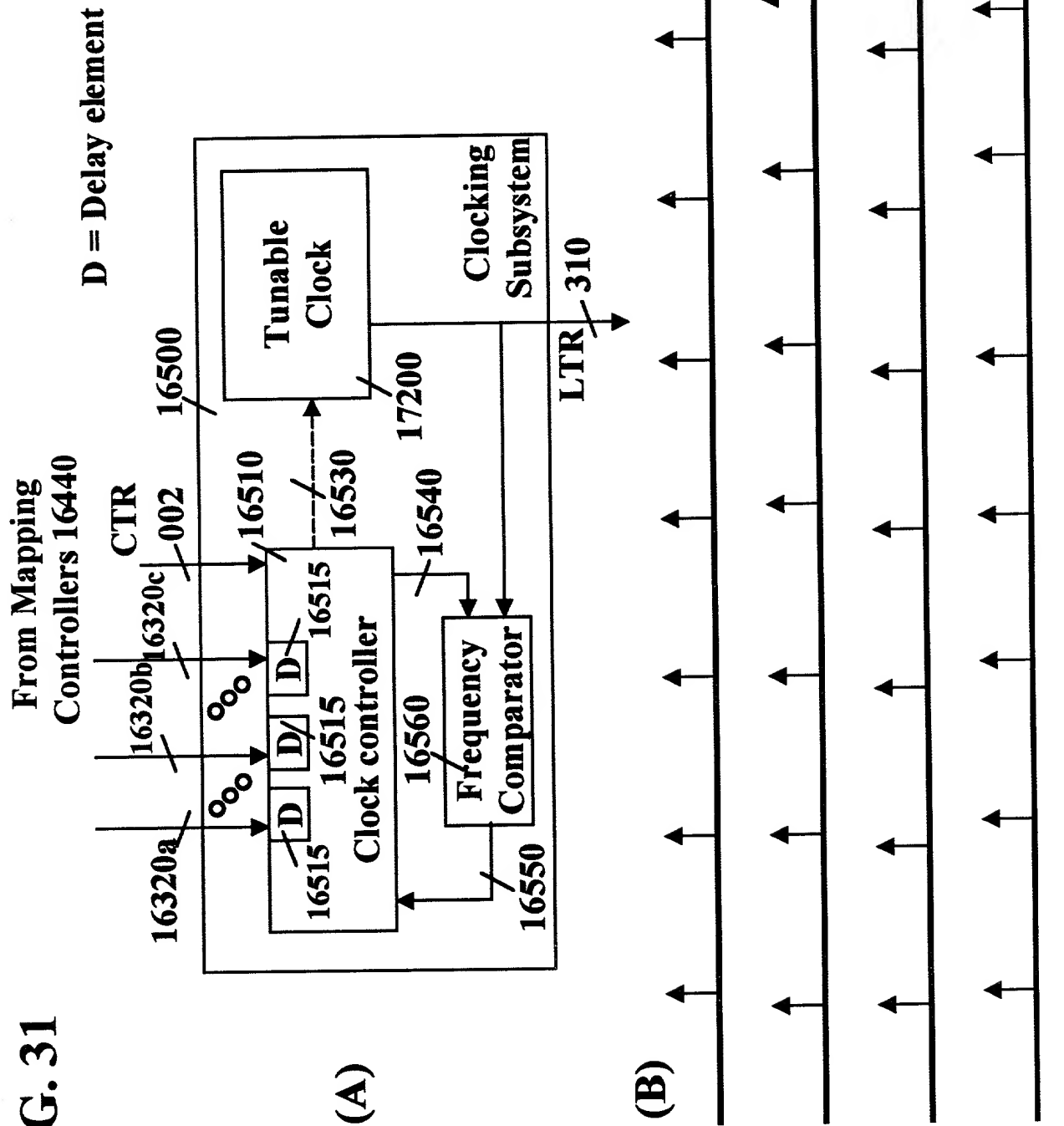


FIG. 32

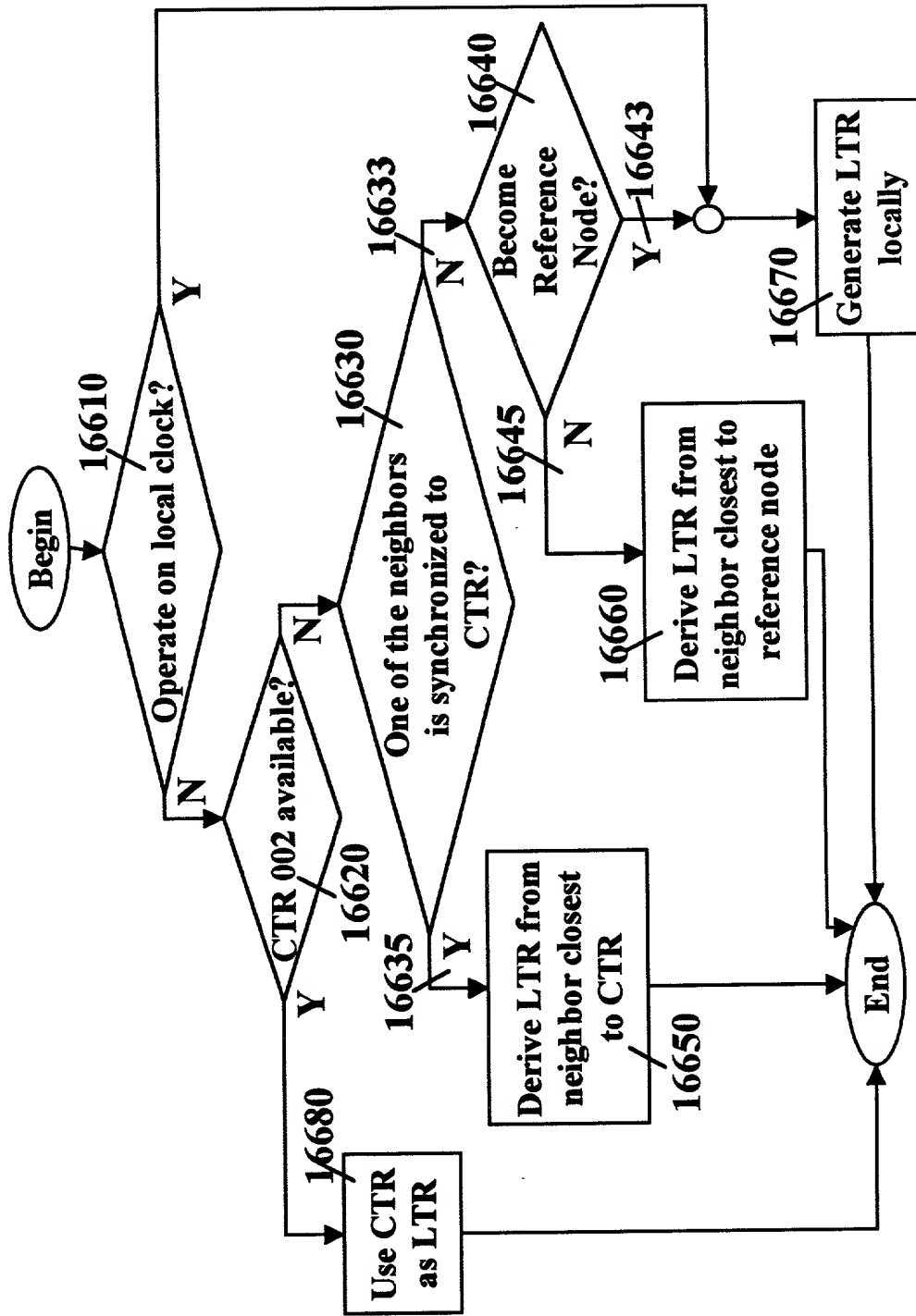


FIG. 33

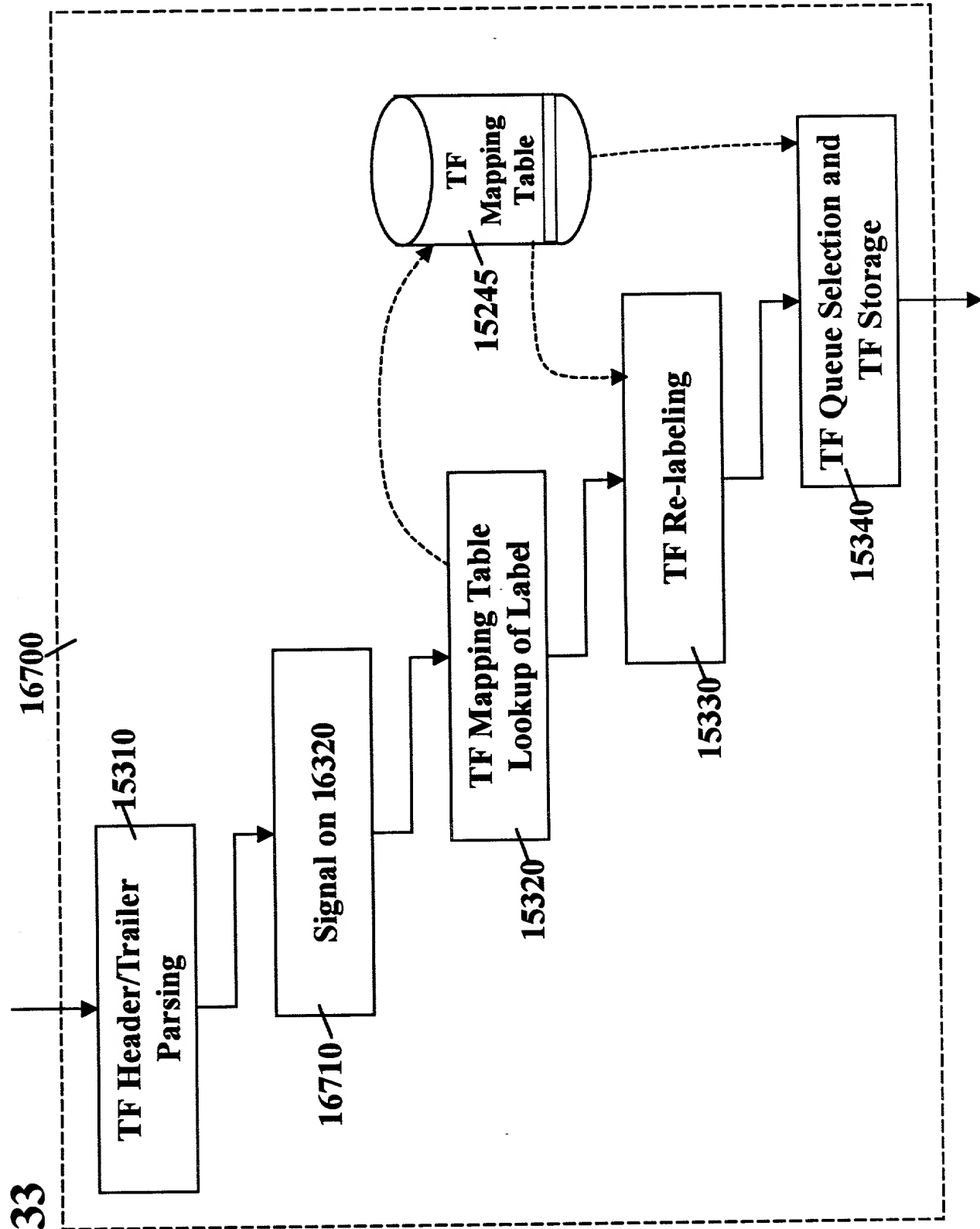


FIG. 34

TF duration [μs]	# TF queues	Memory req. [Kbytes]	Clock accuracy	Stratum	Tolerance				
					D	H	M	S	
7.8125	20	195	1.00E-10	1	7	16	27	42	
7.8125	20	195	1.60E-08	2	0	1	9	10	
7.8125	20	195	4.60E-06	3	0	0	0	14	
7.8125	20	195	3.20E-05	4	0	0	0	2	
7.8125	200	1,953	1.60E-08	2	0	13	21	35	
7.8125	200	1,953	4.60E-06	3	0	0	2	47	
7.8125	200	1,953	3.20E-05	4	0	0	0	24	
7.8125	1000	9,766	1.60E-08	2	2	19	36	48	
7.8125	1000	9,766	4.60E-06	3	0	0	14	6	
7.8125	1000	9,766	3.20E-05	4	0	0	2	1	
15.625	20	391	1.00E-10	1	15	8	55	25	
15.625	20	391	1.60E-08	2	0	2	18	20	
15.625	20	391	4.60E-06	3	0	0	0	28	
15.625	20	391	3.20E-05	4	0	0	0	4	
15.625	200	3,906	1.60E-08	2	1	2	43	11	
15.625	200	3,906	4.60E-06	3	0	0	5	34	
15.625	200	3,906	3.20E-05	4	0	0	0	48	
15.625	1000	19,531	1.60E-08	2	5	15	13	36	
15.625	1000	19,531	4.60E-06	3	0	0	28	13	
15.625	1000	19,531	3.20E-05	4	0	0	4	3	
31.25	20	195	1.00E-10	1	30	17	50	50	
31.25	20	195	1.60E-08	2	0	4	36	41	
31.25	20	195	4.60E-06	3	0	0	0	57	
31.25	20	195	3.20E-05	4	0	0	0	8	
31.25	200	1,953	1.60E-08	2	2	5	26	22	
31.25	200	1,953	4.60E-06	3	0	0	11	9	
31.25	200	1,953	3.20E-05	4	0	0	1	36	
31.25	1000	9,766	1.60E-08	2	11	6	27	12	
31.25	1000	9,766	4.60E-06	3	0	0	56	26	
31.25	1000	9,766	3.20E-05	4	0	0	8	6	

FIG. 34

FIG. 35

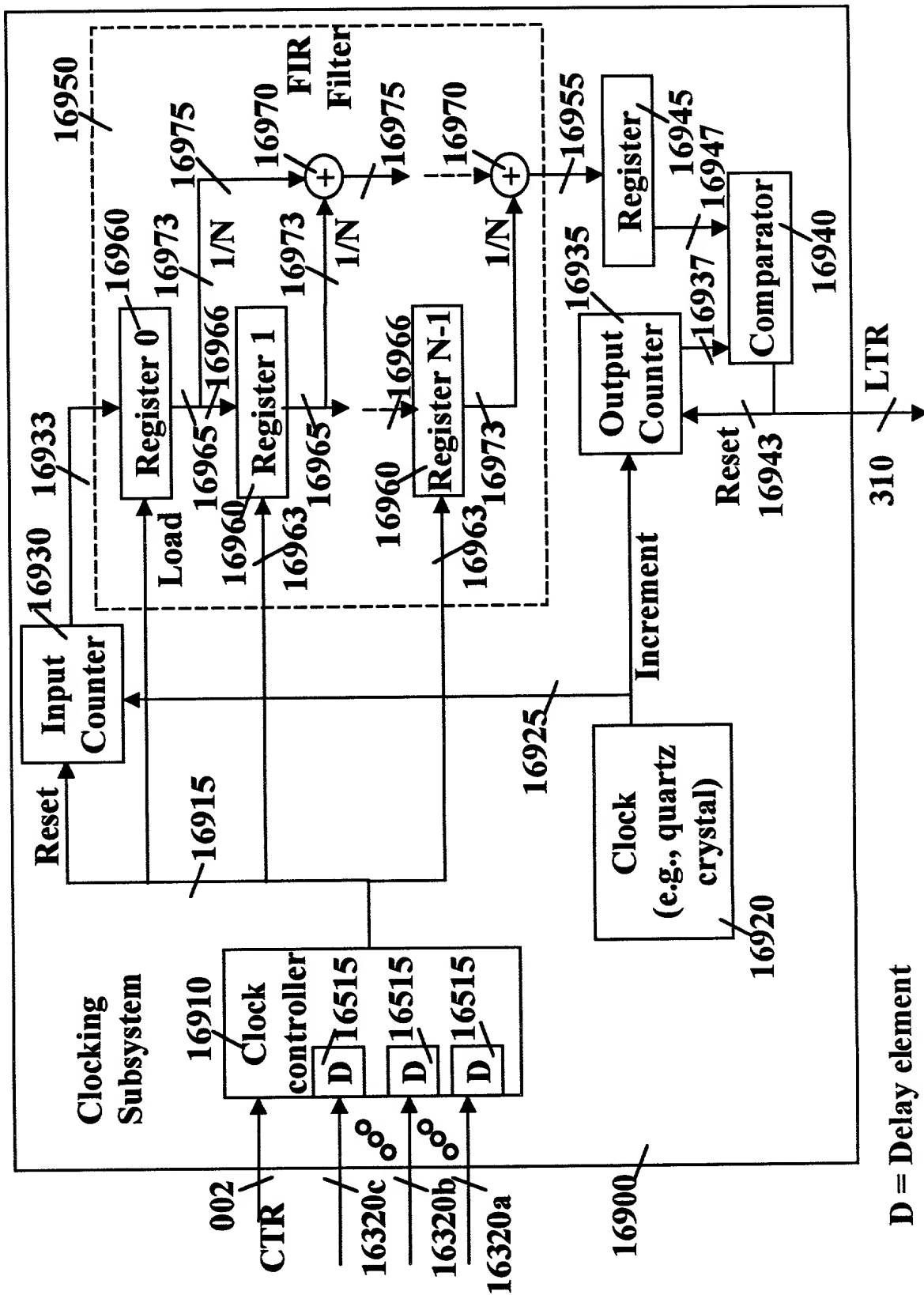


FIG. 36

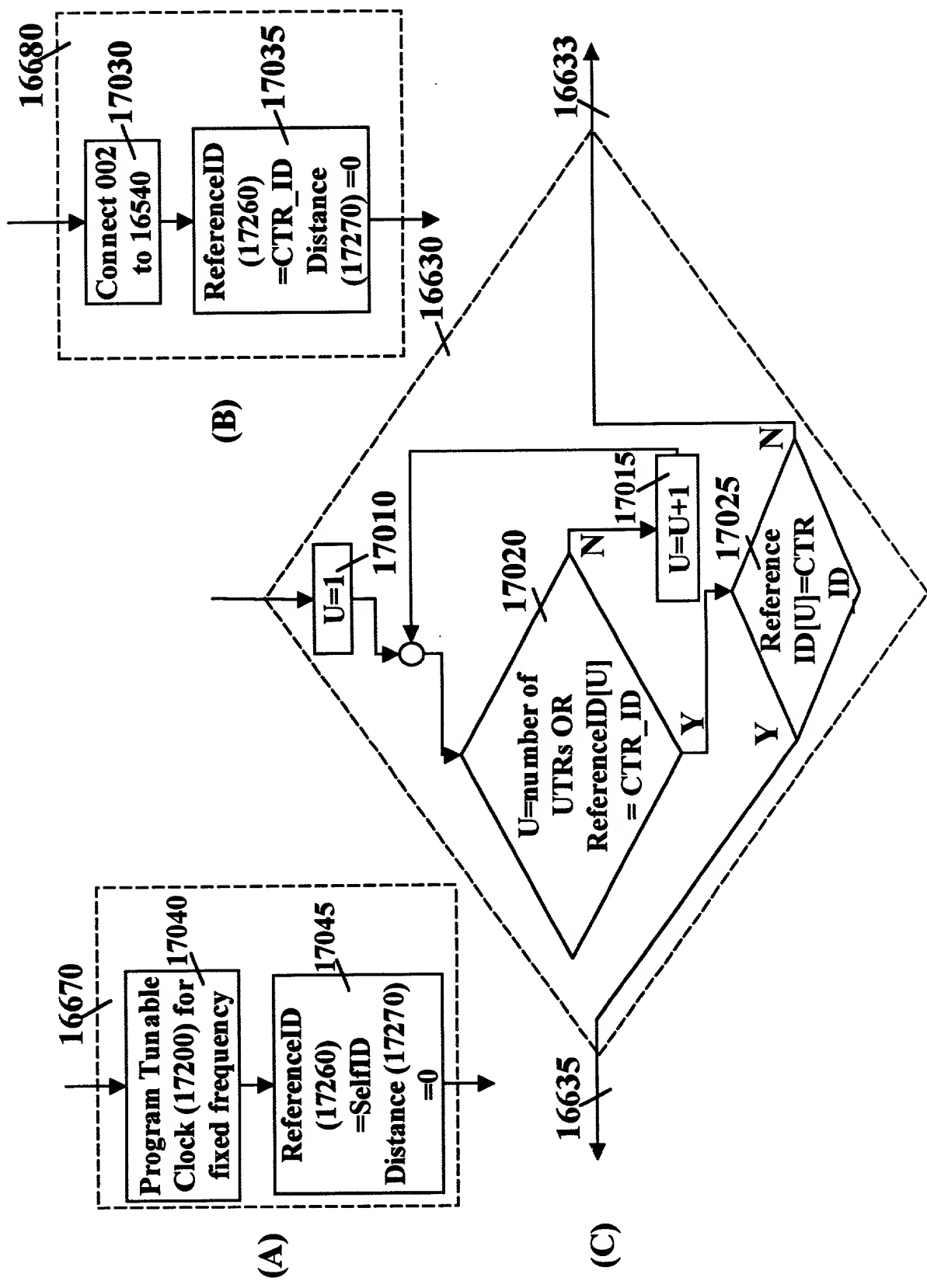


FIG. 37

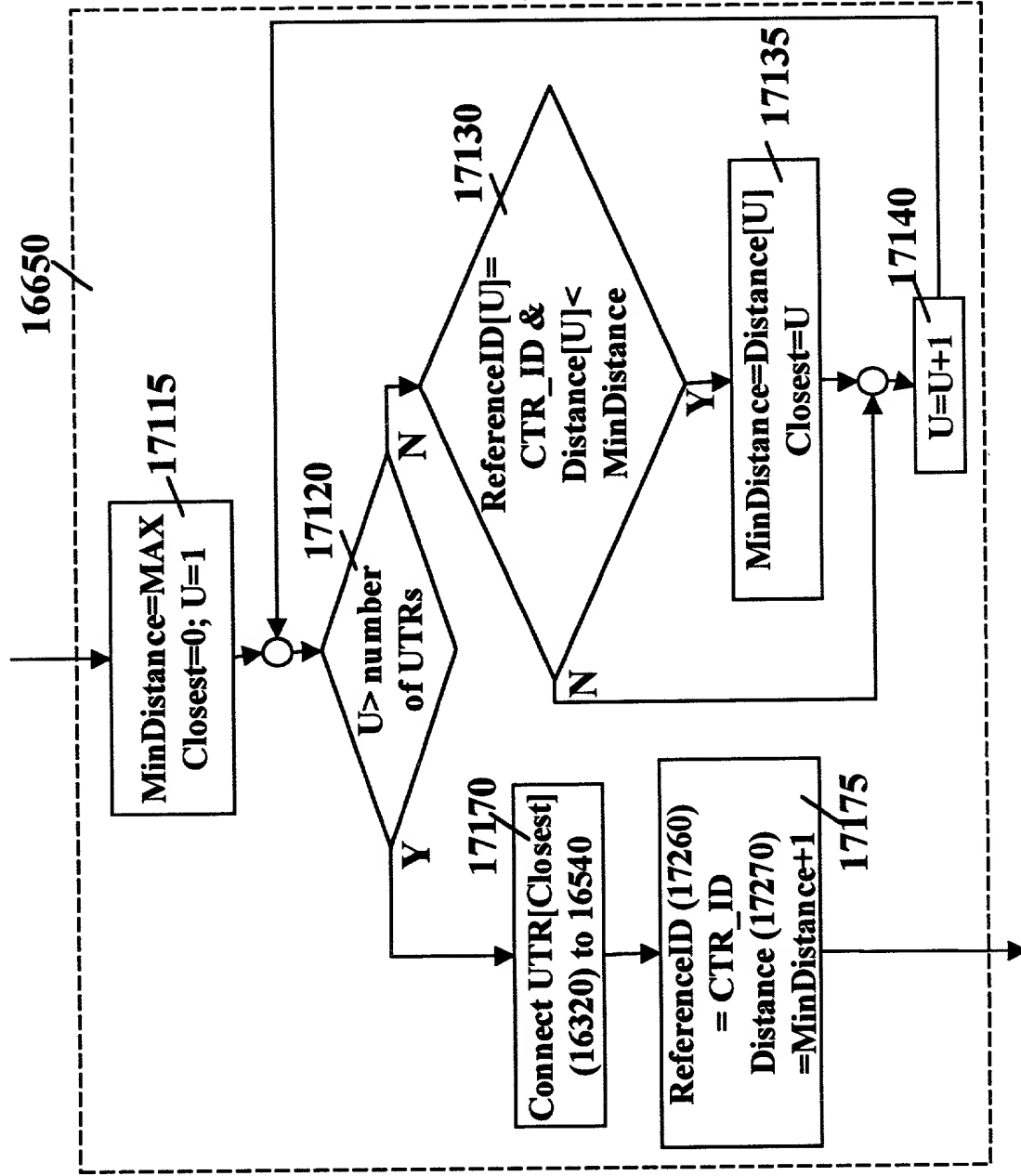
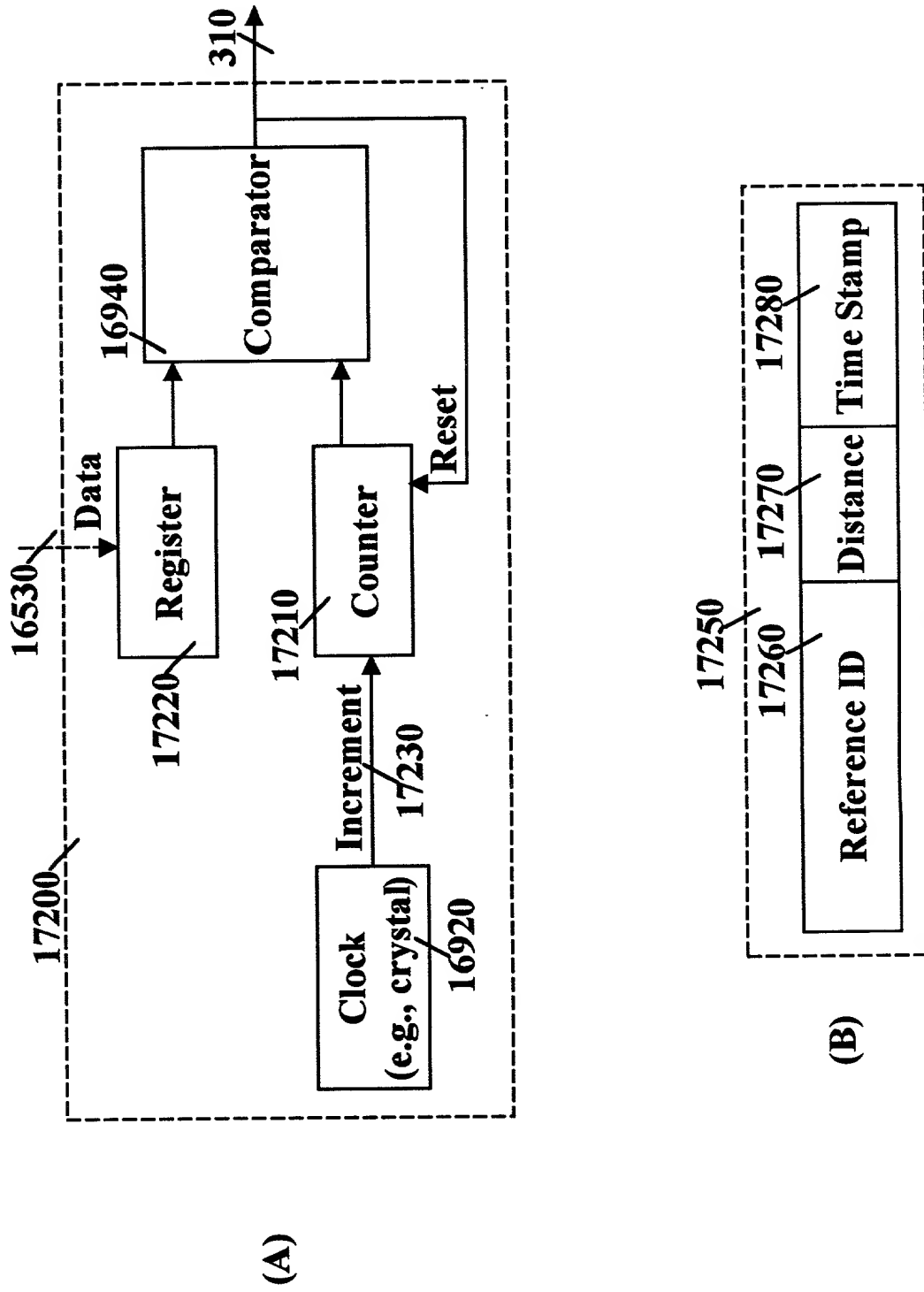


FIG. 38



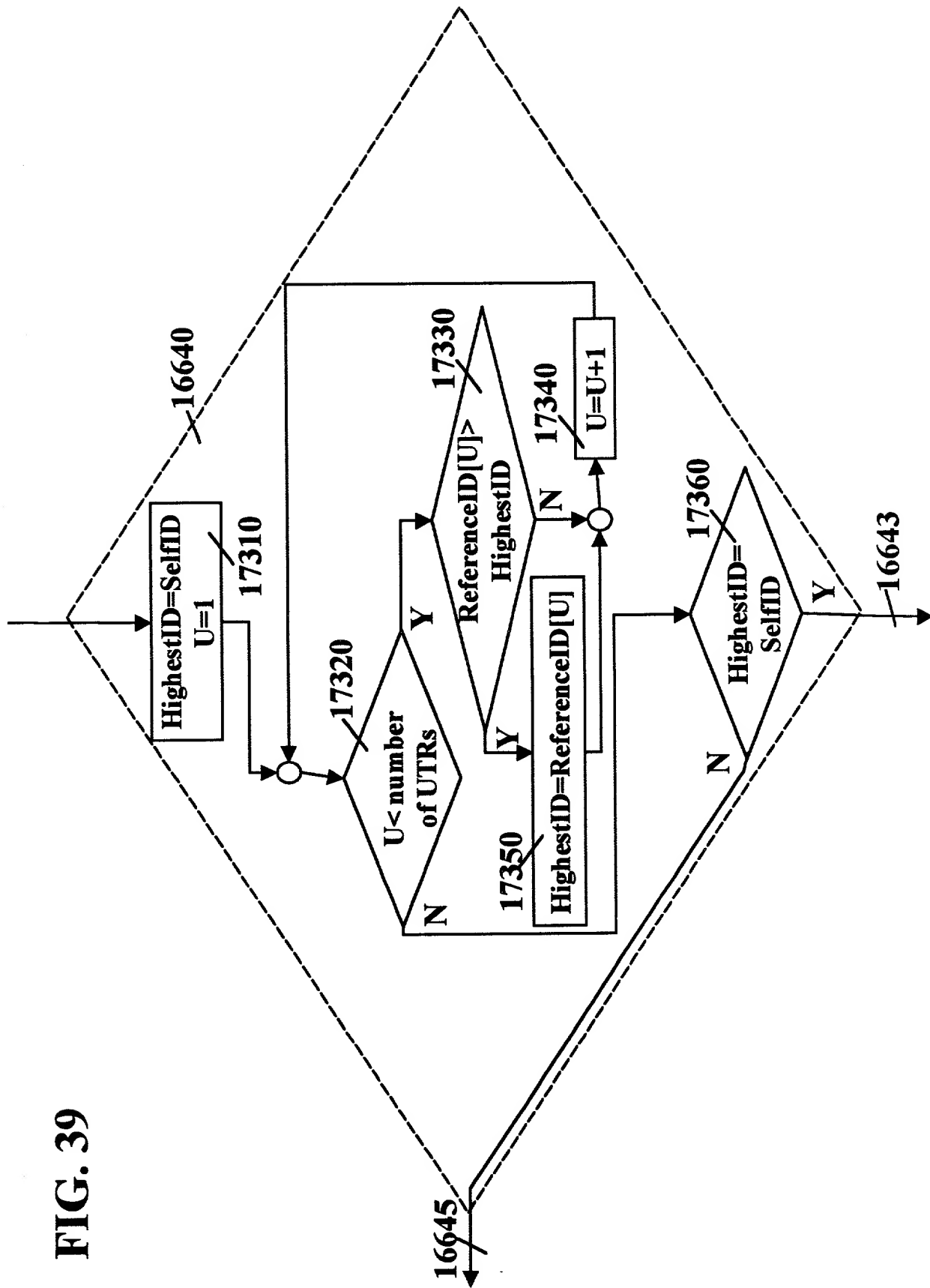


FIG. 39

FIG. 40

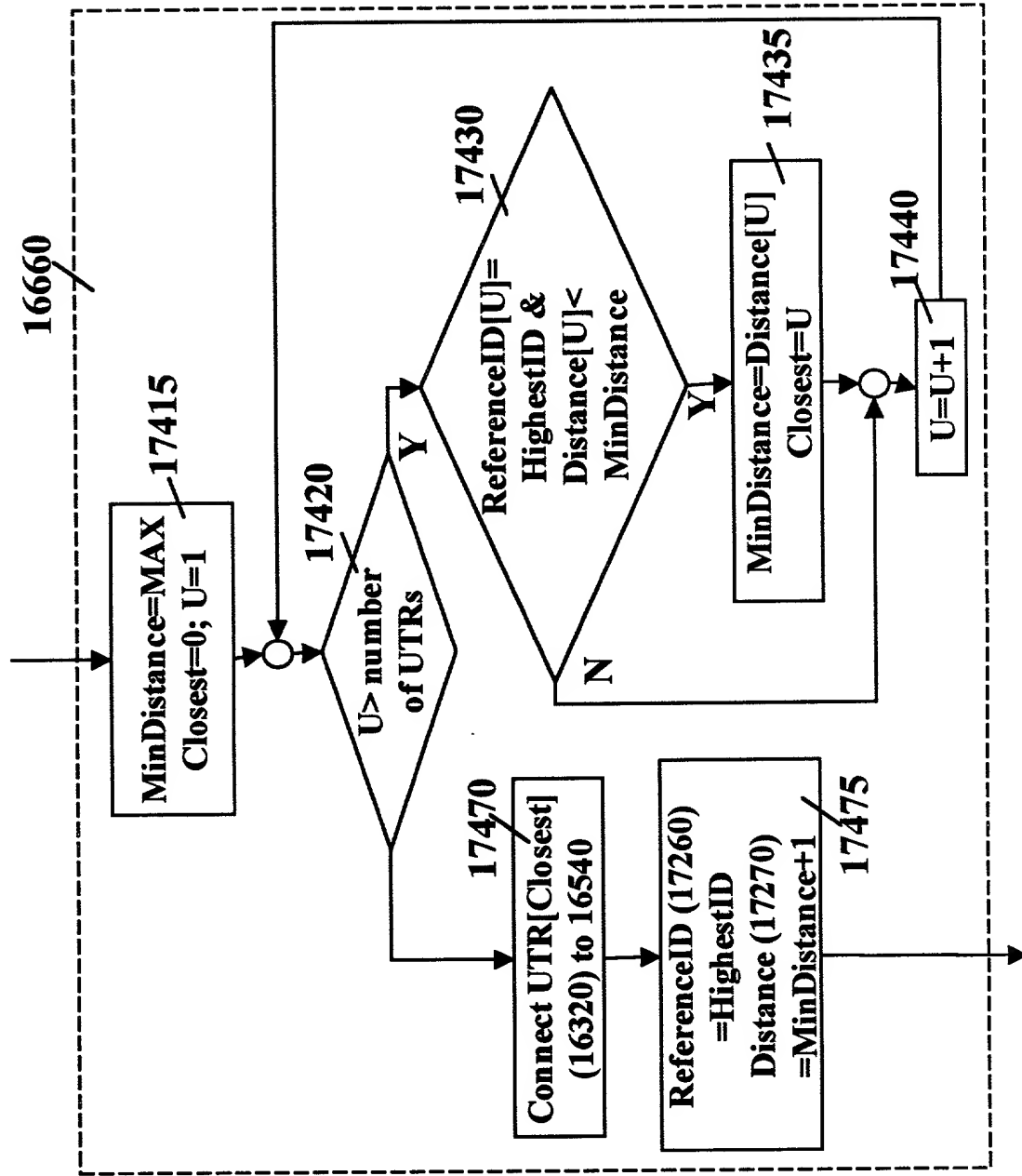


FIG. 41

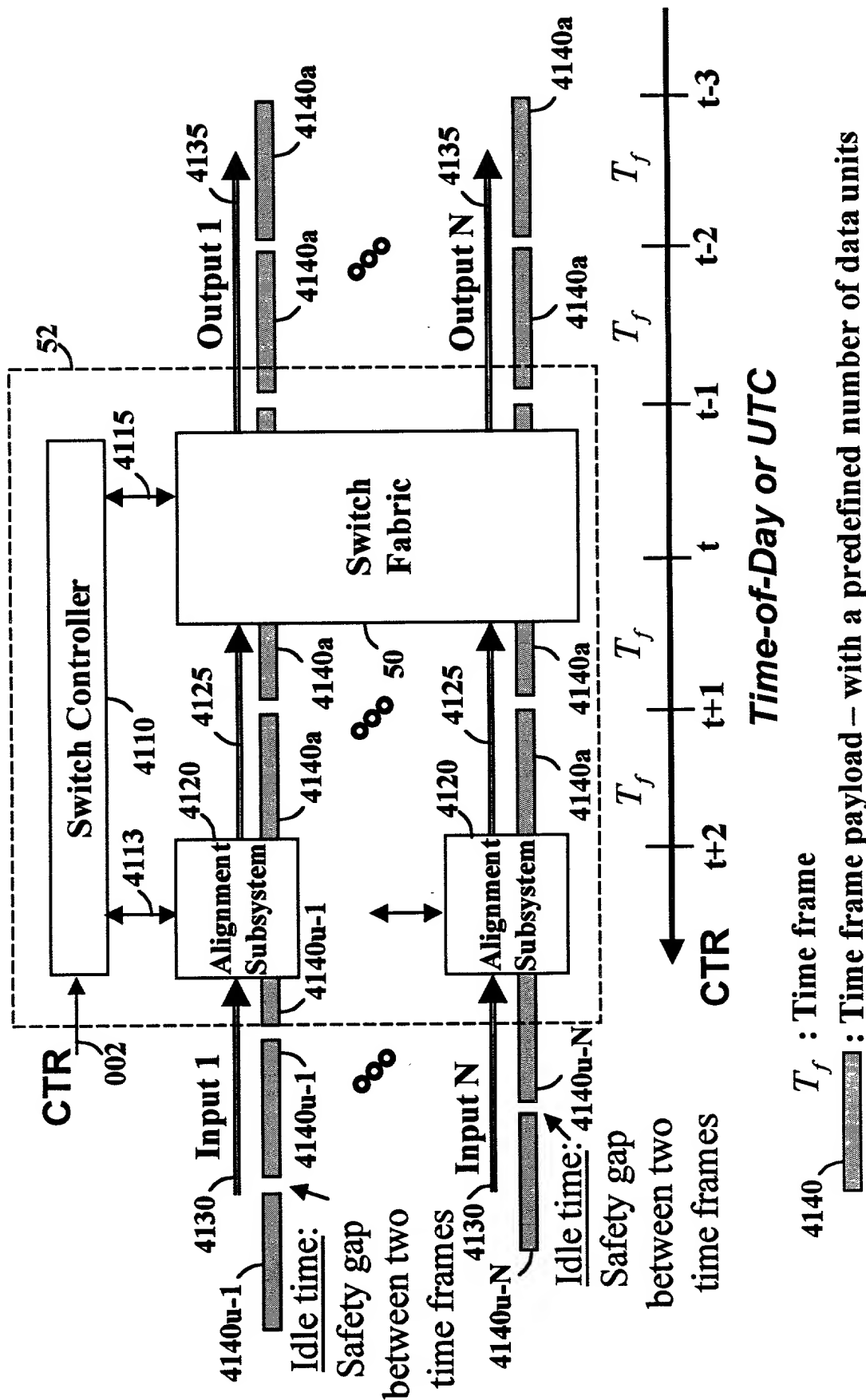


FIG. 42

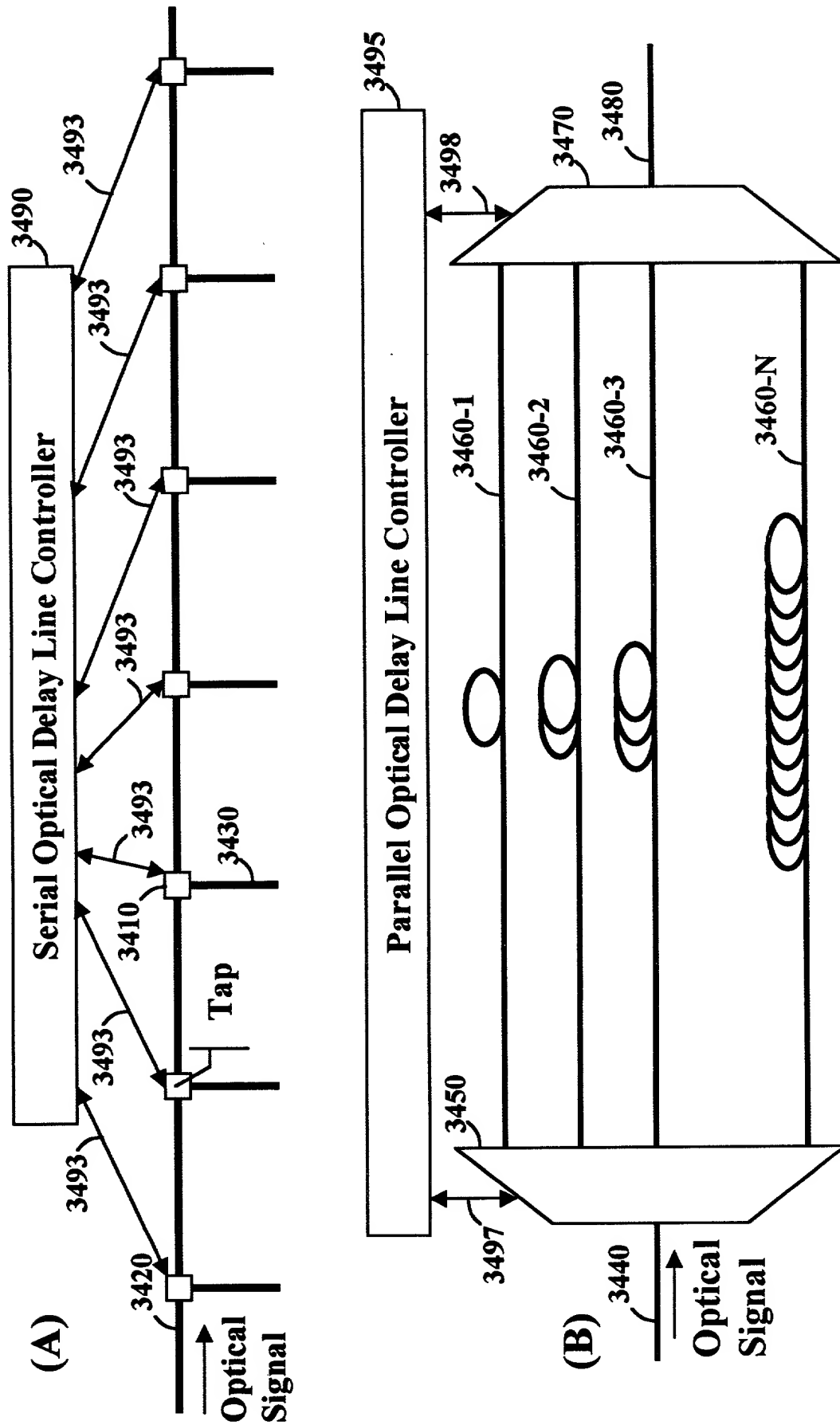


FIG. 44

FLI: Fractional Lambda Interface
TDS: Time Driven Switch

